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Vol. 41 JULY–AUGUST 1915 No. 158

United States Naval Institute Proceedings

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Vol. 41, No. 4 July-August, 1915 Whole No. 158

United States Naval Institute Proceedings

PUBLISHED EVERY TWO MONTHS
EDITED BY B. C. ALLEN

U. S. NAVAL INSTITUTE
ANNAPOLIS — MARYLAND

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The Lord Baltimore Press
BALTIMORE, MD., U. S. A.

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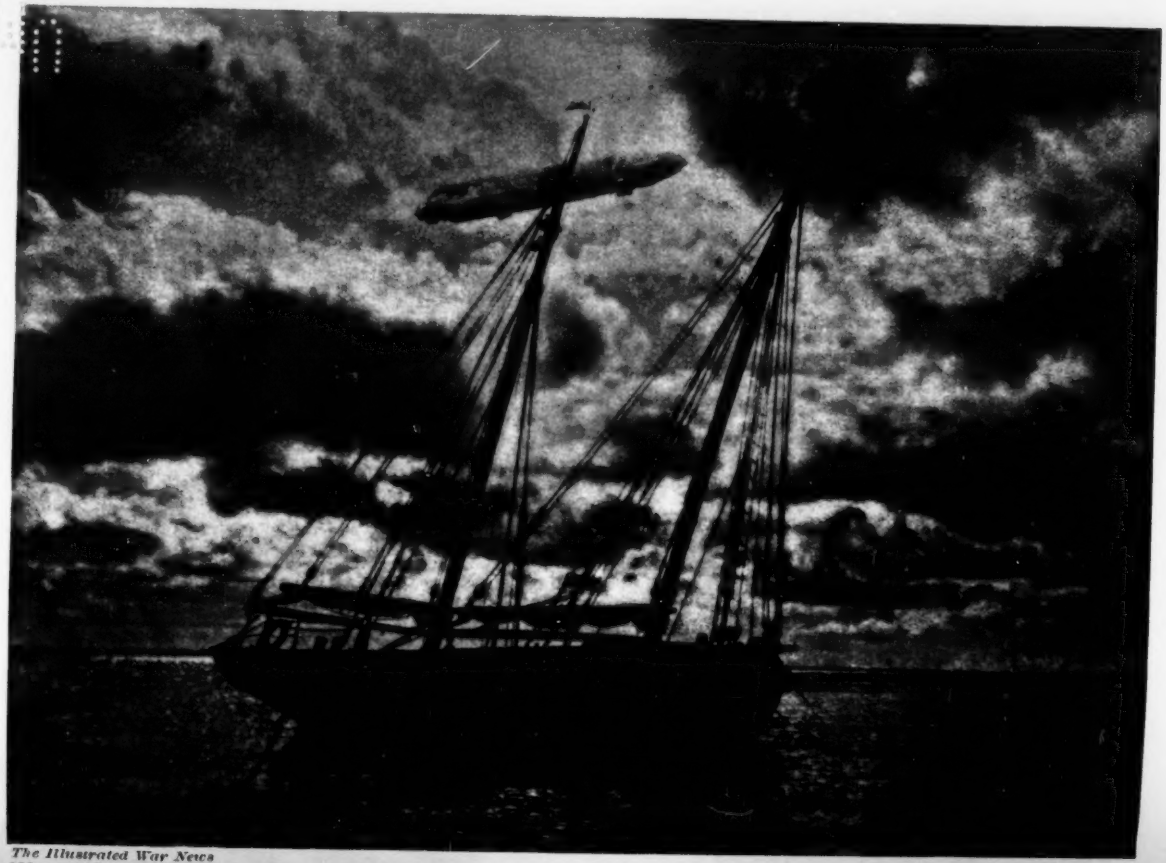

The Illustrated War News

When Not Engaged in Raiding: A Zeppelin Flying Over the Mouth of the Elbe, Among Thunder-Clouds

Germany is credited with having had ready for war service before the outbreak of hostilities eight Zeppelins, of the rigid aluminium-framed type, three Parseval airships, or non-rigids, two Schütte-Lanz semi-rigids, and two special army craft of the *M* type. Our illustration shows the Zeppelin *Z 3* flying over the mouth of the Elbe, among thunder-clouds. Large clouds, it is noteworthy, have been turned to account by the German airships on several occasions—at least once, it has been stated, during the war in Belgium—for concealment during an approach. The Zeppelin seen is one built in 1912. All Zeppelins are to be

Honorable Mention Essays 2 and 3 cannot be published on account of their confidential nature.

UNITED STATES NAVAL INSTITUTE PROCEEDINGS

Vol. 41, No. 4 JULY-AUGUST, 1915 Whole No. 158

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE CONTROL OF FLEETS IN ACTION

By ENSIGN H. H. FROST, U. S. Navy

Motto: "Each lieutenant without asking for orders from the general himself took the best practicable dispositions."—Cæsar.

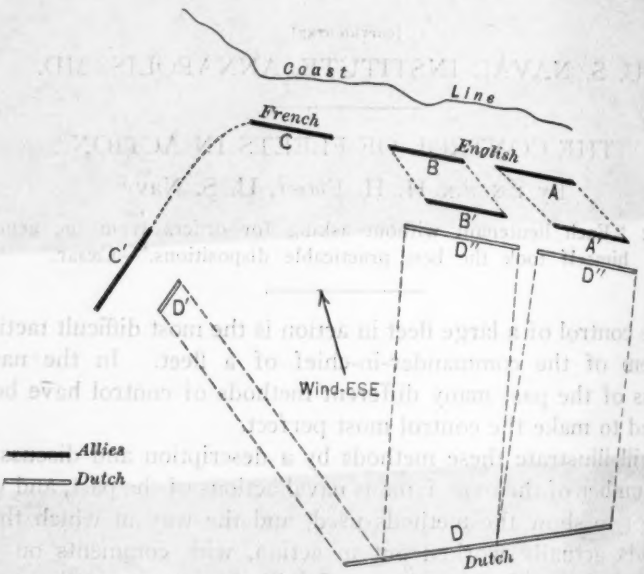
The control of a large fleet in action is the most difficult tactical problem of the commander-in-chief of a fleet. In the naval actions of the past many different methods of control have been devised to make the control most perfect.

I will illustrate these methods by a description and discussion of a number of the most famous naval actions of the past, and will attempt to show the methods used, and the way in which these methods actually worked out in action, with comments on the value of the various methods. I will then compare the naval action in the days of sailing ships with the naval action to-day, and will attempt to show the value of the various methods, and deduce the method best fitted for the control of a fleet in a naval action to-day.

The battle of Southwold Bay was fought June 7, 1672, between the Dutch, under their famous admiral, De Ruyter, with 90 ships, and the allied English and French fleets of 100 ships. The Allies were at anchor close to the English coast, the English in two squadrons, *A* and *B*, and the French in one squadron, *C*, the crews

NOTE.—The essay upon which Ensign Frost was awarded honorable mention 1915, is entitled "Tactics." On account of its confidential nature, its publication in the PROCEEDINGS has been refused.

being engaged in taking on water from the shore. The wind, ESE., was toward the shore. When the Dutch were sighted the Allies got under way, the English squadrons on the starboard tack, heading about northeast, while the French took the port tack heading about south, thus widely separating their forces. De Ruyter dispatched from his fleet, *D*, a very small division, *D'* to contain the French squadron, and then with the main body of his fleet attacked the English, having by this skilful disposition obtained superior numbers at the decisive point. The Dutch con-



BATTLE OF SOUTHWOLD BAY, JUNE 7, 1672

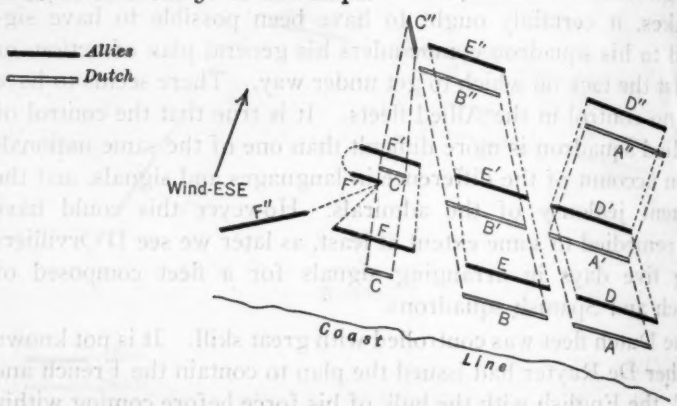
taining force, being to windward, was able, by clever handling, to keep the French in play without coming to close action. De Ruyter inflicted severe losses upon the English, so as to delay for some months the projected invasion of Holland.

In this action there seems to have been no control whatever of the Allied fleet. There were several methods that could have been used. In this case the commander-in-chief could well have issued prearranged instructions as to the manner of getting under way and the general positions of the three squadrons in the battle formation, or at least the general direction in which the fleet was to form for action. If the commander-in-chief had most carefully educated his subordinates in tactics, and especially his own tactics,

the French admiral would certainly have realized the importance of keeping his squadron within supporting distance of the rest of the fleet, especially as the enemy had the wind in his favor, and was free to make a quick attack on that part of the formation which offered the most chances of success. The commander-in-chief was actually taken completely by surprise and had not made any of these necessary preparations. He could not have followed Napoleon's maxim: "A great captain ought to say to himself several times a day: If the enemy's army appeared in front, on my right, or on my left, what should I do? If he finds himself embarrassed, he is badly stationed, he is not according to the rules, he ought to seek a remedy." However, even if he had made these mistakes, it certainly ought to have been possible to have signalled to his squadron commanders his general plan of action, or at least the tack on which to get under way. There seems to have been no control in the Allied fleets. It is true that the control of an allied squadron is more difficult than one of the same nationality, on account of the difference in languages and signals, and the frequent jealousy of the admirals. However this could have been remedied to some extent at least, as later we see D'Orvilliers using five days in arranging signals for a fleet composed of French and Spanish squadrons.

The Dutch fleet was controlled with great skill. It is not known whether De Ruyter had issued the plan to contain the French and attack the English with the bulk of his force before coming within sight of the enemy, or whether this move was decided on after the separation of the Allied fleets was noticed. What seems most probable is that De Ruyter had discussed with his admirals and captains the various plans open to him, among which was the plan actually used. That De Ruyter had educated his captains in tactics is shown by the very clever way that the French were held in play without having to come to close action, and the great improvement shown by the admirals and captains in this action over their conduct in the last war, six years before. And it is also probable that this definite plan was not prescribed until after the enemy were sighted and the separation of their squadrons seen. However, as the French fleet at that time was known to De Ruyter to be extremely inefficient, and was organized in a separate squadron, his decision to contain it, even if made before he was in sight of the enemy, was really made after the dispositions of the enemy were known, and was therefore, in the true sense of

the phrase, not a prearranged plan. That the Allies would divide their forces in such an incredible way could surely not have been foreseen by the Dutch, and it is to take advantage of such errors on the part of the enemy that the general plan of action should be delayed until all the dispositions of the enemy are seen. After the general plan was signalled, De Ruyter allowed it to be executed by his subordinates, using their own initiative, except that he probably himself commanded the center squadron, as was usual for the commander-in-chief to do, when the forces engaged were so large that he was unable to control the whole fleet. The granting of initiative to subordinate commanders was necessary in fleets of from 50 to 100 ships.



BATTLE OF THE TEXEL, AUGUST 21, 1673

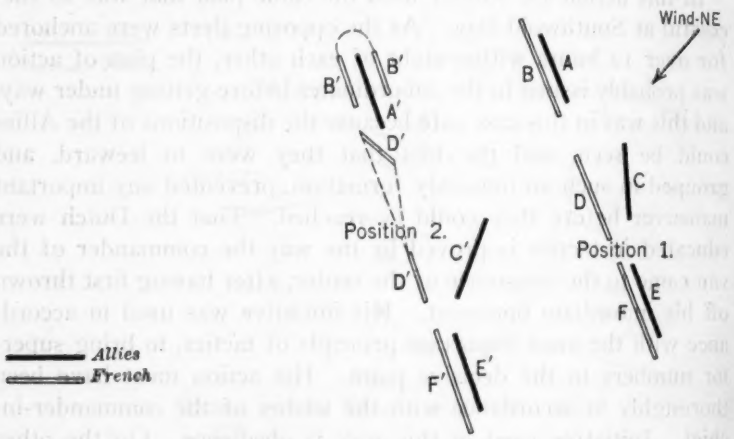
The battle of the Texel was fought off the Dutch coast, August 21, 1673, between the Dutch, having 70 ships, with De Ruyter as commander-in-chief, and the allied English and French, having 90 ships, of which 30 were French. At daybreak De Ruyter bore down to the attack with the wind. The leading Dutch squadron, *C*, was composed of about 10 ships and had opposed to it a French squadron of 30 ships. To this squadron De Ruyter gave orders to contain the French squadron, while he with the two remaining squadrons attacked the English on equal terms, thus repeating his tactics of Southwold Bay. After the French had been held in play for some time, their admiral made signal for the van to tack around the leading Dutch ships and attack them from the other side, to put them between two fires. When this maneuver was partly executed, the Dutch, under the same commander who had

maneuvered so successfully against the French in the previous action, wore and ran through the French column on the starboard hand. Seeing that the French were in confusion and did not follow, this Dutch squadron stood down to the aid of De Ruyter's own squadron and joined in the fight there. This was a most brilliant concentration of superior numbers at the decisive point, and was accomplished despite the fact that the Dutch were decidedly inferior to the Allies. In this action the French played an almost incredible part, and that the French admiral had orders not to risk his ships, as the report is, is extremely probable. However this does not lessen the skill of the Dutch, for they took advantage most quickly of the weakness of the enemy.

In this action De Ruyter used the same plan that was so successful at Southwold Bay. As the opposing fleets were anchored for over 12 hours within sight of each other, the plan of action was probably issued to the subordinates before getting under way, and this was in this case safe because the dispositions of the Allies could be seen, and the fact that they were to leeward, and grouped in such an unwieldy formation, prevented any important maneuver before they could be reached. That the Dutch were educated in tactics is proved by the way the commander of the van came to the assistance of the center, after having first thrown off his immediate opponent. His initiative was used in accordance with the most important principle of tactics, to bring superior numbers to the decisive point. His action must have been thoroughly in accordance with the wishes of the commander-in-chief. Initiative used in this way is obedience. On the other hand, the initiative used by the Allied officers was nothing but insubordination. The action of the French was practically treachery. The English officer commanding the rear had a personal grudge against the Dutch admiral, Tromp, who commanded the rear squadron of the Dutch fleet. The English admiral, in his haste to get into action, hove to his squadron, thus forming a big gap between it and the center. With his flagship he opposed the flagship of the enemy, neglecting the control of his squadron. Being forced to shift his flag to another ship, his boat was swamped in the passage and he was drowned. During this time the Allied center was being attacked by the Dutch center and van, while both their own rear and van were at such a distance that they could give no assistance. Initiative that is not used to further the plan

of the commander-in-chief, or is not used in accordance with correct tactical principles, in which all officers have been instructed, is certainly most injurious. As initiative is most necessary in a naval action, the education of the officers in the correct tactical principles is most important.

De Ruyter's method in these two actions appears to be as follows: First, careful education of the admirals and captains in his own tactical ideas. Second, the formation of his general plan after the dispositions of the enemy were known, this plan being given to the squadron commanders. Third, the granting of initiative to subordinates to execute the general plan, and to act in general as they thought best when the plan became no longer



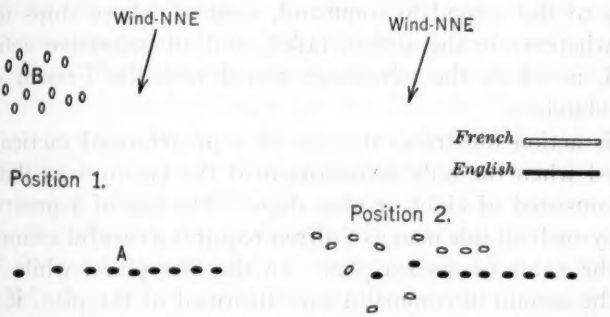
BATTLE OF BEACHY HEAD, JULY 10, 1690

useful. This most excellent method of control was not to be seen again until the days of Suffren and Nelson.

The battle of Beachy Head was fought July 10, 1690, between the Allied English and Dutch fleets, 56 ships, and the French, under Tourville, 70 ships. The Allies in three squadrons stood down to the attack with the wind. The van, *A*, composed of Dutch ships, coming into action first, unsupported by the center and rear, was roughly handled. The Allied center, *C*, composed of English ships, was kept at long range to prevent the enemy from doubling on the rear, which, being composed of a mixture of Dutch and English ships, came to close range, *E*. This action of the Allied commander-in-chief caused a gap between the van and the center. The commander of the French van tacked his

leading ships around the Dutch column and attacked it from both sides, *B'*. Tourville, having beaten off the Allied center, signalled for his leading ships to attack the rear of the enemy's van. This move decided the action, in which the Allies lost 10 ships, and would have lost many more had Tourville pushed the pursuit. This move was similar to that made at the Texel, except in this case it was made by the commander-in-chief, who was actually acting at the time as a squadron commander. The direct control by the commander-in-chief of one squadron, or over the ships nearest to him, will be noticed in most battles.

The first battle between Suffren and Hughes was fought February 17, 1782. The French, under Suffren, had 12 ships against the English nine. In this action Suffren acted under a prearranged plan which had been issued to his second in command,



FIRST BATTLE BETWEEN "SUFFREN" AND "HUGHES," FEBRUARY 17, 1782

but does not seem to have been explained to his captains. "If we are to windward, as the English are not more than eight or at most nine, my intention is to double on their rear. Supposing your division to be in the rear, you will see by your position what number of ships will overlap the enemy's line and will make signal to them to engage on the lee side. *In any case,* I beg you to order to your division the maneuvers which *you think best fitted to assure the success of the action.*"

The English were in column headed to the east, *A,* with the French running down with the wind, *B.* By the most fortunate chance, Hughes, believing that there was not wind enough to tack, remained in this position, which was perfectly suited for the execution of Suffren's plan. The French commander-in-chief, taking the lead, followed by three ships, attacked on the weather side the fifth, sixth, seventh and eighth ships in the English

column, as was the plan. He then signalled for three ships to engage the English to leeward, and for all to come to within pistol shot of the enemy. Neither of these signals were obeyed, although the second in command knew of the prearranged plan, for which an opportunity had so fortunately arrived. Only one ship that received the order engaged on the lee side of the English column, although another on the initiative of the captain engaged without orders. The flagship did not come to within pistol range of the English, standing off at long range to prevent the leading English ships from tacking to double on the French van. This was a perfectly proper position for the leading ship, but in thus standing off an example was given which induced the other ships to likewise stay at long range, despite the signal that was flying for close action. The attack, due to this misunderstanding and the inefficiency of the second in command, most of whose ships took no part whatever in the action, failed, and an indecisive action resulted, in which the advantage rested with the French despite their blunders.

This action illustrates the use of a prearranged tactical plan, devised when the only information of the enemy was that their fleet consisted of eight or nine ships. The use of a prearranged plan by such an able man as Suffren requires a careful examination into the value of such a plan. In the first place, while we see that the second in command was informed of the plan, it can be inferred from an incident of the battle that the captains were not carefully instructed in the tactical plans of the admiral. If the plan had been explained, or if the captains had been educated in tactics, they would have realized the reason why the flagship did not close to pistol range as the signal required. This reason was that if the first ships closed, it would have been possible for the leading English ships to have doubled on them. In other words, it was the duty of the first ships by keeping at long range to contain the first ships of the enemy, De Ruyter's maneuver on a small scale, so that superior forces could be concentrated on the English rear. Had the French captains understood this, they would not have followed the example of the flagship, but would have closed to pistol range as both the signal and the plan required. Also, if the captains of the rear ships had been acquainted with Suffren's plan, it is probable that more would have obeyed the signal to engage to leeward, or if the signal was not seen would have

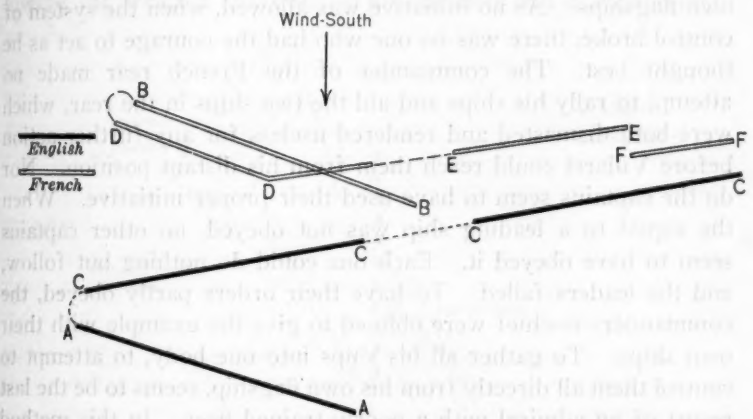
engaged without orders. Thus we see that Suffren had not educated the captains in his tactical plans.

If a prearranged plan is of any value, the conditions in this case were certainly as favorable for its success as could be wished for. The small numbers on each side were favorable, as well as the fact that the French had the advantage in numbers, 12 to 9. The first requisite of the plan was the advantage of the wind. The French were most fortunate in obtaining this. To concentrate on the rear of a line, while the leading ships are out of the action, is a maneuver so difficult that there is practically no chance of it succeeding, if the enemy makes any counter maneuver to avoid it, or an offensive maneuver against the attacking squadron. The English admiral formed column on the tack most favorable for the enemy to attack his rear, and made no effort to avoid it, although he must have seen it in time, as he says in his report: "The enemy steered down on the rear of our line in an irregular line abreast." He claims that there was not enough wind to tack. Then this was extremely lucky for the French. But there was nothing to prevent him from keeping away before the wind, and then forming on the tack which would prevent an attack on his rear, as he had already made this maneuver before on that same day. As it happened, due to remarkable luck and the poor judgment of the enemy, an excellent chance was afforded for the success of the plan, which was ruined by the tactics of the captains, to whom the plan had not been explained. It must be realized that any prearranged tactical plan counts on the fact that the enemy will stand passively on the defensive, and make no attempt to avoid it or any offensive maneuver against the attacking fleet. A plan that in this way relies on conditions over which the commander-in-chief has no control, is evidently dangerous, especially as it is made before the dispositions of the enemy are known, or his initial maneuvers seen. It will be noticed that this plan was not definitely ordered, as it was stated to be only the intention of the commander-in-chief, and that the plan was indicated to the captains during the approach to the battle, by the example of the flagship in stopping opposite the fifth ship in the English column, and by the signal for three ships to engage on the lee side. This plan, therefore, cannot be called a definite prearranged tactical plan, but the probable plan of the commander-in-chief, to be executed only when the signal for it was made. Instead of indicating

but one plan, for the execution of which it was not likely that the conditions would be favorable, would it not have been more advisable to have carefully instructed the captains in all the plans and ideas of the admiral, leaving the decision as to the exact plan until the dispositions of the enemy were known and the fleets were so near that a decided maneuver by the enemy would be impossible? That Suffren considered it very probable that the plan could not be executed as planned, is indicated by his most wise instructions to the second in command: "*In any case,* I beg you to order to your division the maneuvers which *you think best fitted* to assure the success of the action." That this granting of most liberal freedom of action to the second in command was wise is proved by Suffren's own words: "Being at the head, I could not well see what was going on in the rear." Had the second in command obeyed these instructions and fallen on the rear of the enemy with all his force there can be no doubt that a decisive victory would have been gained. The action of one captain in engaging his ship from the lee side without orders was a most wise use of the initiative that should be allowed to every captain. Nelson said: "No captain can do very wrong who places his ship alongside that of an enemy," which maxim this captain obeyed, and in addition placed his ship in the position his commander desired.

In the battle of May 29, 1794, the English, with Howe in command, had 25 ships, while the French, under Villaret Joyeuse, had a like number. At the beginning of the action the fleets were in long parallel columns, *AA* and *BB*, the French being to windward. At 6 a. m. the English started to tack in succession to the position *CC*, to try to engage the rear of the French fleet, which had been avoiding the action. At 7.45 Villaret, seeing that the English van might reach his rear, started to wear in succession, and stood down on the line *DD*. The French van, arriving opposite their rear, with which the English van had been able to exchange a few shots, hauled to the wind in succession, *EE*, so as not to lose any more ground to leeward. This brought the two fleets again on parallel courses. These maneuvers were ordered by signal from the flagship to the leading ships. The English flagship was tenth in the column, and the French flagship twelfth, and there seems to have been no difficulty in this method of control, as long as the fleets were not engaged. At 10 the French van, *FF*, stood down and engaged the English van at long range. At noon Howe sig-

nalled to tack in succession and pass through the French column. The *Cæsar,* the leading English ship, did nothing until the signal had been up one hour, when she wore instead of tacking. The next seven ships followed the example of the *Cæsar,* and headed for the French, but only one reached their line, being subjected to a heavy concentrated fire as the French column passed it. Howe himself, to give the example, then tacked and stood for the French line, followed by the ship ahead and the ship astern of the flagship. These reached and passed through the French line. The two rear French ships, which had suffered severely in an action the day before, were rather behind and to leeward of the French column. These were attacked and surrounded by five or six



ACTION OF MAY 29, 1794, BETWEEN HOWE AND VILLARET JOYEUSE

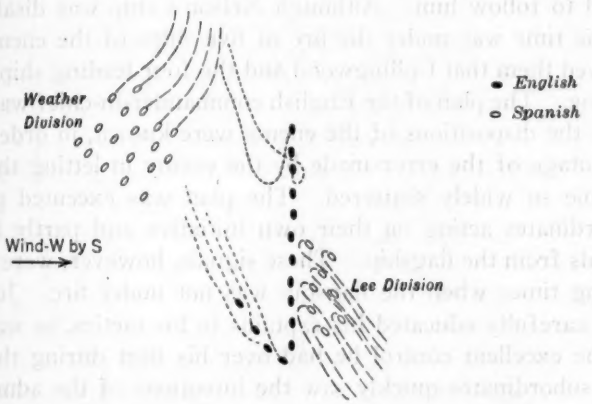
English ships, and received severe losses. The French admiral, to protect his rear ships, signalled to wear in succession. The leading ship was too much injured to come about, and therefore the French flagship, to set the example, wore and, followed by the ships astern of her, stood down toward the rear. The two end ships were rescued by this move, the English fleet by this time being entirely out of formation. The English then formed column to windward of the French, but made no further effort on this day to force the action.

In this action each fleet was formed in one body, which appeared to have no subdivisions, the commanders-in-chief having direct control over the whole fleet, except in the one case of the French van, which for a time was separated from the main body. While outside of range, before the action commenced, this system seemed

to work with a certain degree of success. The signals seem to have been transmitted correctly, but the maneuvers in succession took about two hours each, which is a big disadvantage of this formation, which is necessary for the system of direct control used in this action. The value of this control was quickly proved as soon as the action began. The signal for a simple maneuver, to tack in succession, after flying for one hour without result, threw the entire English fleet into confusion. The French admiral had no better results, as his signal was never obeyed. All initiative in subordinates seemed to be stifled; there appear to be no admirals engaged on either side except the commanders-in-chief: it is certain that the influence of other admirals was not seen outside their own flagships. As no initiative was allowed, when the system of control broke, there was no one who had the courage to act as he thought best. The commander of the French rear made no attempt to rally his ships and aid the two ships in the rear, which were both dismasted and rendered useless for any further action before Villaret could reach them from his distant position. Nor do the captains seem to have used their proper initiative. When the signal to a leading ship was not obeyed, no other captains seem to have obeyed it. Each one could do nothing but follow, and the leaders failed. To have their orders partly obeyed, the commanders-in-chief were obliged to give the example with their own ships. To gather all his ships into one body, to attempt to control them all directly from his own flagship, seems to be the last resort of an admiral with a poorly trained fleet. In this method the ability of subordinates is not used, for they are allowed no initiative, the fleet is unwieldy and can use but the simplest maneuvers, principally those made in succession, which take so long a time to complete, and, in the end, all control is lost and the action becomes a mêlée.

The battle of Cape St. Vincent was fought February 14, 1797, between the English, under Jervis (15 ships), and the Spanish (27 ships). The latter, headed for Cadiz and not expecting an attack, were divided into two irregular bodies, about eight miles apart, the windward division consisting of 21 ships and the leeward division of six ships. When the hostile fleets came in sight of one another, the lee division hauled to the wind to rejoin the main body. The English headed between the two divisions in a single column. Three Spanish ships of the weather division succeeded

in passing ahead of the English and joining the lee division. Before more could pass, the English column had separated the two divisions. The weather division now headed to the north to pass the rear of the enemy, while the lee division headed directly for the English in an attempt to break through the line. Jervis signalled from his flagship, the *Victory*, seventh in the column, to tack in succession and bring the weather division to close action. As the Spanish lee division drew near, the *Victory* slowed to wait for them, and with the ships astern beat off the attack, the Spaniards being so severely handled that they took no further part in the action. Then the *Victory* tacked after the leading ships toward the weather division. This division had a considerable



BATTLE OF CAPE ST. VINCENT, FEBRUARY 14, 1797

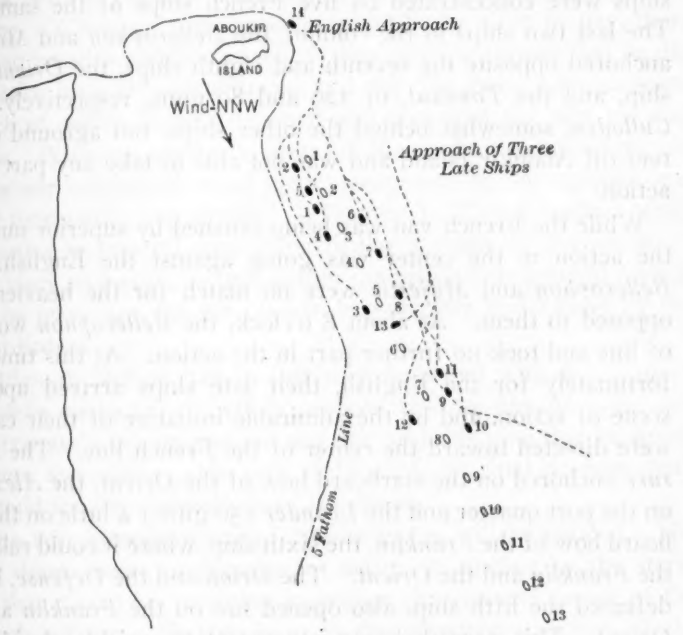
start on the leading ships of the English column, and the English rear ships until they reached the point of turning would be actually going in the opposite direction from their objective. Therefore, Nelson, a commodore at this time and in command of the third ship from the rear, knowing that the plan of the commander-in-chief was to keep the two divisions of the enemy from joining, wore out of line and stood across the bows of the leading ships of the weather division, which was still in an irregular group formation. The rear ship, commanded by Collingwood, received orders to follow him from the admiral. These two ships with the assistance of the leading ships succeeded in taking four of the largest Spanish ships.

The move of Nelson's was a most proper use of the initiative that should be granted the captain of a ship. In a discussion of

this move the conditions of the action should be taken into consideration. The lee division had been easily defeated, and as these ships took no further part in the action, the odds were at this time only 18 to 15. The weather division had made every effort to avoid the action, and in fact had a very good chance to escape it altogether. The inefficient condition of the Spanish Navy was known to all, and had been shown earlier in the action by the weak effort of the lee ships. At the time of this maneuver the action was practically a general chase. At such a time it was important to stop them until the van ships could arrive, even if one or two ships were sacrificed to stop them. That Nelson's move was thought correct by the admiral was shown by his signal to Collingwood to follow him. Although Nelson's ship was disabled, and at one time was under the fire of five ships of the enemy, he so delayed them that Collingwood and the four leading ships arrived in time. The plan of the English commander-in-chief was formed after the dispositions of the enemy were known, in order to take advantage of the error made by the enemy in letting their ships become so widely scattered. The plan was executed partly by subordinates acting on their own initiative and partly by direct signals from the flagship. These signals, however, were all made during times when the flagship was not under fire. Jervis had very carefully educated his captains in his tactics, as was shown by the excellent control he had over his fleet during the action. The subordinates quickly saw the intentions of the admiral, and carried them out most promptly.

The battle of the Nile was fought between the English, under Nelson (13 ships and one 50-gun ship), and the French, under Brueys (13 ships). The main body of the English fleet sighted at 3 p. m. the French fleet at anchor in Aboukir Bay. Although three ships, the *Culloden, Swiftsure* and *Alexander,* with the 50-gun ship *Leander,* were at some distance from the main body of the fleet scouting (there being no frigates with the fleet), Nelson decided upon immediate action. The English hauled sharp on the wind to clear the shoals off Aboukir Island. Nelson signalled to prepare for action, to anchor by the stern, and that it was his intention to engage the van and center of the enemy. Rounding the shoal the flagship was the third in column. Captain Hood in the *Zealous,* second ship, stood in close to the reef in turning, sounding continually, so that all ships outside of him would be

safe. Captain Foley in the *Goliath,* leading ship, with brilliant initiative, decided to pass inside the French line, and, crossing the bow of the first French ship, passed her on his port hand and anchored off the port quarter of the second ship, opening fire at sunset. The *Zealous* followed and anchored inside the first ship. The *Orion* passed around both these ships and anchored on the



ENGLISH		FRENCH	
1. Goliath	8. Defense	1. Guerrier	8. Tonnant (80)
2. Zealous	9. Bellerophon	2. Conquerant	9. Heureux
3. Orion	10. Majestic	3. Spartiate	10. Mercure
4. Theseus	11. Swiftsure	4. Aquilon	11. Guillaume Tell (80)
5. Audacious	12. Alexander	5. Peuple Souverain	12. Genereux
6. Vanguard (Flag)	13. Leander (50)	6. Franklin (80)	13. Timoleon
7. Minotaur	14. Culloden	7. Orient (Flag-120)	

All ships of 74 guns, except where noted.

BATTLE OF THE NILE, AUGUST 1, 1798

inner side of the fifth French ship. The *Theseus* went between the *Goliath* and *Zealous* and the ships opposed to them, and anchored inside the third in the French column.

The *Audacious,* steering between the first and second French ships, took position on the inner bow of the latter. The first five ships had all anchored inside the French line. Nelson had dropped back from the third to the sixth position in the order, so as to

guide the remaining ships into their positions. He stood along the outside of the column, anchoring opposite the third ship, which was already engaged with the *Theseus* on the other side. The *Minotaur* anchored outside the fourth ship, which had no opponent on the port side, while the *Defense* attacked the fifth ship, which was already engaged with the *Orion*. Thus eight English ships were concentrated on five French ships of the same size. The last two ships in the column, the *Bellerophon* and *Majestic*, anchored opposite the seventh and eighth ships, the *Orient*, flagship, and the *Tonnant*, of 120 and 80 guns, respectively. The *Culloden*, somewhat behind the other ships, ran aground on the reef off Aboukir Island and was not able to take any part in the action.

While the French van was being crushed by superior numbers, the action in the center was going against the English. The *Bellerophon* and *Majestic* were no match for the heavier ships opposed to them. At about 8 o'clock, the *Bellerophon* wore out of line and took no further part in the action. At this time most fortunately for the English, their late ships arrived upon the scene of action, and by the admirable initiative of their captains were directed toward the center of the French line. The *Swiftsure* anchored on the starboard bow of the *Orient*, the *Alexander* on the port quarter and the *Leander* (50 guns) a little on the starboard bow of the *Franklin*, the sixth ship, where it could rake both the *Franklin* and the *Orient*. The *Orion* and the *Defense*, having defeated the fifth ship, also opened fire on the *Franklin* and the *Orient*. This overwhelming concentration quickly decided the action in the center. The *Orient* caught fire and blew up at 10 o'clock, and the *Franklin* surrendered at midnight. Before this the first five ships had also surrendered.

At this point Nelson, by signals to individual ships, endeavored to concentrate his available force on the French rear, but with little success. The *Tonnant* was dismasted, and the *Herreux* and *Mercure* received considerable injuries. At daybreak these were attacked again and with the *Timoleon*, last ship, were run ashore by their own crews. The other two ships escaped, as no English ships were in a condition to pursue.

For several months prior to the battle Nelson had most carefully instructed his captains in tactics and had explained to them in detail his intentions as to his method of attack for all possible

conditions under which he might meet the enemy. "Nelson, in addition throughout the whole of this memorable cruise turned the quarterdeck into what can only be described as a perpetual school for captains. Whenever the weather admitted, he summoned the captains aboard the flagship, where he would fully develop to them his own ideas of the different and best modes of attack and the plans he proposed to execute upon falling with the enemy. Whatever their position might be by night or day, there was no possible position in which they could be found that he did not take into his calculations, and for the most advantageous attack of which he had digested and arranged the best possible plans. With the masterly ideas of their admiral, therefore, on the whole subject of naval tactics every one of his captains was most thoroughly acquainted." (Fitchett.) This is really a study of tactics in general, and in particular a study of the admiral's own ideas on tactics, so that before the action only general signals will be necessary for the plan to be perfectly understood by the subordinates.

Although Nelson had in this way discussed with his captains his ideas on tactics, it will be noticed that he did not issue any prearranged plan, or give out any one probable plan that he would attempt to execute. He very rightly left his final decision until he could see the dispositions of the enemy.

The very general scope of Nelson's plan will be noticed. His only signals were to prepare for action, to anchor by the stern, and that it was his intention to engage the van and center of the French column. No details as to the proposed positions of the individual ships were prescribed, as these would probably serve only to confuse the captains, even if they could be received in time. No order was given to pass inside the French line, nor was such a step even suggested. This plan had been discussed, and the commander-in-chief was sure that the captains would execute it, if it proved possible. Nelson trusted on the initiative of his subordinates, whom he had so carefully instructed.

It might well be said that "every captain distinguished himself." During the first few hours of the action every captain had acted entirely on his own initiative, and had made practically no mistakes. Captain Hood, without orders, stood in close to the reef and acted as a pilot for the rest of the fleet. Captain Foley, with rare courage, passed inside the French line. The captains of the

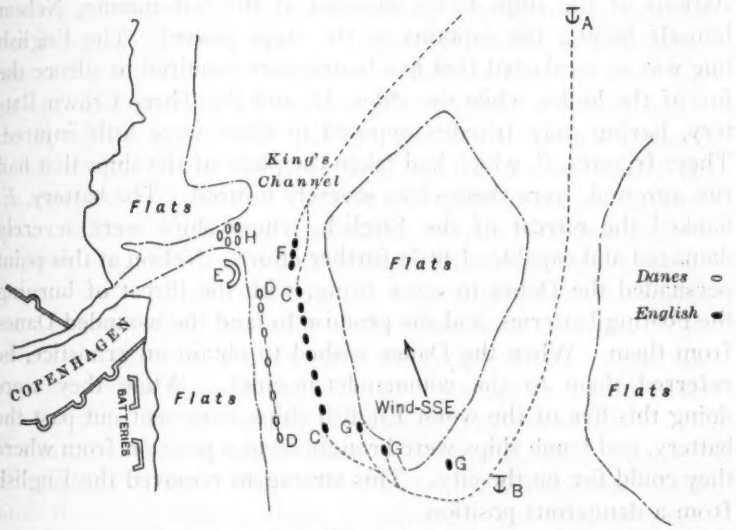
three late ships, *Swiftsure, Alexander* and *Leander,* were at once attracted to the rescue of the *Bellerophon,* and took most favorable positions to concentrate on the French center, and restored the fight where it looked most unfavorable.

After five ships had passed inside, Nelson indicated the course for the remainder by the example of his flagship passing along outside of the line. This was a perfect opportunity for leading by example.

After the action in the van and center had been decided, the concentration of all the English ships available on the French rear would naturally appear to be the correct move. We may assume that the captains, educated as they were in tactics, recognized this to be the correct move. At this time, due to the darkness and the losses sustained, and the severe exertions of the many hours of continual fighting, the English fleet was in confusion and almost completely exhausted. It would have required captains of the most exceptional ability to have forced the pursuit on their own initiative under these severe conditions. In this case, a general signal, under normal conditions the proper proceedure, for all ships to attack the French rear would not have the force in spurring the captains on to renewed efforts that individual signals would have. This pressure on the captains must have been Nelson's object in sending the individual signals, and this is their only justification, because the admiral could not know the condition of his own ships or those of the enemy, especially as he was badly wounded and was able to stay on deck but a part of the time, and the captains were certainly in a better position to know what their ships were capable of and to decide the exact manner in which their ships could be used to the most advantage. Nelson in this action lived up to his statement of many years before: "Now had we taken ten sail and allowed the eleventh to escape when it would have been possible to have got at her, I could never have called it well done."

The French appear to have been completely surprised. Evidently nothing had been arranged beforehand. It had not even been decided whether, if the English appeared, they would fight under way or at anchor. When the English were sighted, a council of war was held, and it was decided to fight at anchor. If this was their plan, their position should have been made as secure as possible. Their leading ship was anchored so far from the shallow

water that ships could easily pass inside. In fact, after the *Zealous* was anchored, another ship passed inside of it. The interval between ships was great, and the rear flank was in the air. Instructions had been issued to pass cables between ships, to prevent the enemy from breaking through the line, and to have springs on the anchors, so that the ships could be headed in any direction desired, but none of these directions were carried out. A large part of the men were ashore getting water, and some were unable to return to the ships before the action commenced.



BATTLE OF COPENHAGEN, APRIL 2, 1801

After the action commenced the French acted passively on the defensive. The rear ships, when they saw that no attack was made against them, made no effort to come to the aid of the van and the center. As the wind was against them this would have been somewhat difficult, and at least would have given the rear ships a better chance to escape in case of a defeat.

The battle of Copenhagen was fought between the English (12 ships and three frigates), under Nelson, and Danish floating and shore batteries before the city of Copenhagen. The main fleet, of which Nelson's division was a detachment, was anchored four miles from the city at *A*. The day before the action, Nelson was anchored at *B*. On the day of the battle, April 2, 1800, the cap-

tains were given their final orders on board the flagship. The prearranged plan was for the ships of the line to anchor in prescribed positions opposite the line of Danish hulks, *DD*, and the Three Crown Battery, *E*, the principal effort to be made against the hulks, which could bring to bear about 400 guns. The frigates were to wait in reserve until the plan was developed and then were to be used to the most advantage. Three English ships, *GGG*, either ran aground or were unable to weather the shoal. This rendered useless the elaborate plan, and required the stations of the ships to be changed at the last minute, Nelson himself hailing the captains as the ships passed. The English line was so weakened that five hours were required to silence the fire of the hulks, while the ships, *H*, and the Three Crown Battery, having only frigates opposed to them were little injured. These frigates, *F*, which had taken the place of the ships that had run aground, were themselves severely injured. The battery, *E*, flanked the retreat of the English, whose ships were severely damaged and capable of little further effort. Nelson at this point persuaded the Danes to cease firing, with the threat of burning the floating batteries, and the promise to land the wounded Danes from them. When the Danes wished to obtain an armistice, he referred them to the commander-in-chief. While they were doing this five of the worst English ships were sent out past the battery, and bomb ships were brought in to a position from where they could fire on the city. This stratagem removed the English from a dangerous position.

A prearranged plan can be spoiled in two ways: maneuvers of the enemy and false maneuvers and mishaps of our own ships. This action gave great chances of success to a prearranged plan, because the enemy were not able to maneuver. On the other hand, the channel was difficult and practically unknown, which fact caused three ships to be of no use in the action, and to a great degree spoiled the plan. This plan provided an exact station for each ship and prescribed the course by which this position was to be gained. This is in sharp contrast to the battle of the Nile, where the positions of the ships and the courses to gain these positions were left entirely to the captains. When the English ships grounded, Nelson, hailing the ships as they passed, changed altogether their instructions. This action proved that the prearranged plan is of doubtful advantage even under the most favorable conditions.

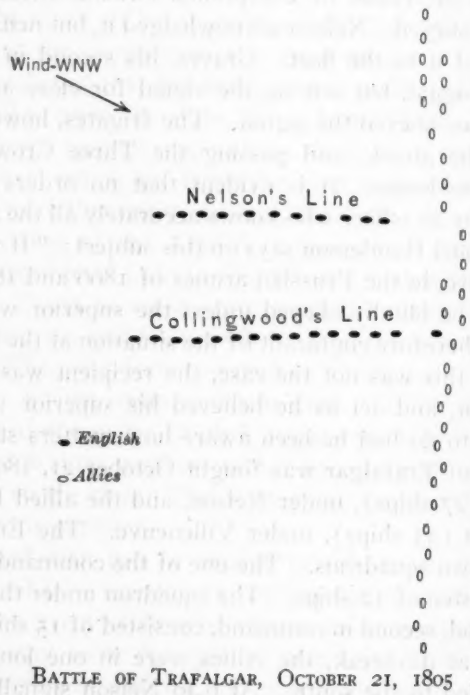
In the middle of the action the signal was hoisted on the flagship of the commander-in-chief, four miles from the scene of the action, to "leave off action." This signal was made from a position where comparatively nothing was known of the actual conditions of the battle. Direct orders given from a distance, where the actual conditions are not known, will be very nearly always incorrect, and if correct will be so by pure chance. In this case if obeyed, they would have caused great danger to the English fleet. It was the result of exceptional circumstances only that they were not obeyed. Nelson acknowledged it, but neither obeyed it nor repeated it to the fleet. Graves, his second in command, repeated the signal, but left up the signal for close action. No ships of the line obeyed the signal. The frigates, however, withdrew from the attack, and passing the Three Crown Battery suffered severe losses. It is evident that no orders should be given except by an officer who knows accurately all the actual conditions. Colonel Henderson says on this subject: "It was understood, therefore, in the Prussian armies of 1866 and 1870 that no order was to be blindly obeyed unless the superior was actually present, and therefore cognizant of the situation at the time it was received. If this was not the case, the recipient was to use his own judgment, and act as he believed his superior would have directed him to do had he been aware how matters stood."

The battle of Trafalgar was fought October 21, 1805, between the English (27 ships), under Nelson, and the allied French and Spanish fleets (33 ships), under Villeneuve. The English were divided into two squadrons. The one of the commander-in-chief, Nelson, consisted of 12 ships. The squadron under the command of Collingwood, second in command, consisted of 15 ships. When first sighted at daybreak, the Allies were in one long irregular column, headed to the south. At 6.40 Nelson signalled to form the order of sailing, to prepare for battle, and to bear up toward the enemy. The two flagships turned toward the enemy, distant about 10 miles, followed in the most irregular order by the ships in their squadrons, forming two parallel columns at right angles to the column of the enemy.

As soon as the English move was seen in the Allied fleet, Villeneuve signalled his entire fleet to wear together, this maneuver taking until 10 o'clock. At this time the Allies were headed to the north in considerable confusion, which was usual when such a long column was used.

At 8 o'clock the frigate commanders reported aboard the *Victory,* Nelson's flagship, for their instructions. Blackwood, in command of all the frigates, was given authority to do as he thought best, and was even given authority to direct in Nelson's name the movements of the last ships in the columns toward the position in which he believed they would be most needed.

At 11 Nelson signalled to Collingwood: "I intent to pass through the van of the enemy's line to prevent him from getting



BATTLE OF TRAFALGAR, OCTOBER 21, 1805

into Cadiz." The course was changed a little toward the north. At noon the French opened fire on the *Royal Sovereign,* Collingwood's flagship, which was some distance ahead of the other ships in the column. At 12.10 this ship broke through the enemy's line. At 12.20 Villeneuve's flagship opened fire on the *Victory,* and Nelson directed Blackwood to return to his ship, passing along the line and telling each ship to get into action as quickly as possible, regardless of the plan. At 1 the *Victory* broke the line, the French ships crowding around the flagship for support. At this

point, four ships directly behind the French flagship wore out of the line and stood down toward the rear, for what reason it is unknown. The Allied rear closed up on the center and joined the action, but the van continued on its course and drew farther away from the action. At 2 Villeneuve signalled: "The ships that are not engaged take positions that will bring them most rapidly under fire." The van ships by 2.30 had headed toward the southward, five passing to windward, and five to leeward of the action. The last two ships of Nelson's column, just now coming into action, were a most valuable reinforcement, and with their aid the five to windward were beaten off. Those to leeward passed clear of the engaged ships. At 4.45 Admiral Gravina, commander of the rear, retreated to Cadiz with the ships that had not surrendered, 15 in all. Eighteen, including the flagship of the commander-in-chief, were either sunk or taken.

This action is especially interesting on account of the fact that Nelson, the most famous admiral in history, had make known his intentions before the action in the famous Memorandum. The prearranged plan he proposed must be carefully studied and compared with the actual results of the battle.

"Thinking it almost impossible to bring a fleet of 40 sail of the line into a line of battle in variable winds, thick weather, and other circumstances that must occur, without such a loss of time that the opportunity will probably be lost of bringing the enemy to battle in such a manner as to make the business decisive, I have therefore made up my mind to keep the fleet in that position of sailing (with the exception of the first and second in command) that the order of sailing is to be the order of battle, placing the fleet in two lines of 16 ships each, with an advanced squadron of eight of the fastest of the two-decked ships, which will always make, if wanted, a line of 24 sail on whichever line the commander-in-chief may direct."

While all fleets were divided into the van, center and rear, with an officer to command each, these divisions were, as a rule, joined into one column for action, and their commanders were allowed very little initiative. The whole fleet was under the direct command of the commander-in-chief. De Ruyter, over 100 years before, had made definite divisions of his fleet to great advantage, and after his plan was issued he allowed it to be executed by the initiative of his squadron commanders. After this time the sys-

tem of separate squadrons was little used and all ships were united in one long column. Captains were court-martialled who left the line, and admirals were dismissed because they engaged before their line was formed. While Suffren in his actions allowed initiative to his second in command, his whole fleet was brought into action in one body. Possibly if he had had better captains he would have organized his fleet into divisions, and allowed these to be brought into action by subordinates. Nelson was the first admiral since De Ruyter to divide his fleet into definite divisions. Before the Nile, he had recognized this excellent principle by forming his little fleet into three divisions, but these do not appear to have been used at this action. After joining the fleet before Trafalgar, his first move was to form his squadrons, realizing the sooner this was done the better the captains would become acquainted with the abilities of their neighboring ships, and the better the admirals would know the sailing and maneuvering abilities of their squadrons. Another wise provision of the Memorandum was that the fleet were to keep constantly in battle formation, so that they would be ready for action at all times. The advanced squadron was never formed as Nelson's 40 ships never joined his command.

"The second in command will, after my intentions are made known to him, have the entire direction of his line to make the attack upon the enemy, and to follow up the blow until they are captured or destroyed."

The words "after my intentions are made known to him" indicate that Nelson had determined to make his final plan of action after the dispositions of the enemy were known. This plan was to be signalled to the second in command, who was to execute it entirely on his own initiative, both in making the initial attack and following it up until the enemy were destroyed. The two squadron commanders in turn left the control of the individual ships entirely to the captains, who were thoroughly acquainted with the tactical ideas of the commander-in-chief. Nelson said, after the *Royal Sovereign* had broken the line: "Now I can do no more." After thus indicating that the final plan would not be issued until the last hours before the battle, Nelson describes as follows his probable plan if the enemy should be discovered to windward:

"If the enemy's fleet should be seen to windward in line of battle, and that the two lines and the advanced squadron can fetch them, they will probably be so extended that their van could not succor their rear.

"I should therefore probably make the second in command's signal to lead through, about their twelfth ship from the rear (or wherever he could fetch, if not able to get so far advanced); my line would lead through about their center, and the advanced squadron to cut two or three or four ships ahead of their center, so as to ensure getting at their commander-in-chief, on whom every effort must be made to capture."

The very general terms of this plan will be noticed. That nothing was prescribed exactly is shown by the words "or wherever he can fetch," "about their center," "two or three or four." That it was not prescribed as a hard and fast rule is shown by the words "I shall therefore probably make the second in command's signal," which prove that the final plan was to be issued after the dispositions of the enemy were seen. I believe that the plan was issued more as an example of the way in which Nelson wished to concentrate than as an actual plan which he hoped to execute as prescribed. His plan assumed that the commander-in-chief would be in the center of the enemy's column, that the enemy would all be in one column (which formation he himself thought most inadvisable to use), that the line of the second in command would be nearest the rear of the enemy, that the enemy would make no maneuver, but would allow the English to strike the points they aimed at, even though they had the weather position, from which they could easily attempt an offensive move. Unless this plan was used merely as an example, it would seem to be most inadvisable to issue such a detailed plan, which it was practically impossible to execute without many changes, due to facts that could not be foreseen. It would seem better to have limited the plan to the very general ideas in the following paragraphs:

"The whole impression of the British fleet must be to overpower from two to three ships ahead of their commander-in-chief, supposed to be in the center, to the rear of their fleet. I will suppose 20 sail of the enemy's line to be untouched, it must be some time before they could perform a maneuver to bring their force compact to attack any part of the British fleet engaged, or to succor their own ships, which indeed would be impossible without mixing with the ships engaged.

"Something must be left to chance: nothing is sure in a sea fight beyond all others. Shot will carry away the masts and yards of friends as well as foes; but I look with confidence to a

victory before the van of the enemy could succor their rear, and then that the British fleet would most of them be ready to receive their 20 sail of the line, or to pursue them, should they endeavor to make off."

These two paragraphs show the general plan to crush the rear and center of the enemy before the van can come to the rescue. It is probable that after the detailed plan was written Nelson, realizing that it would be hardly possible to execute it as ordered, gave the more general plan, so that the second in command and the captains would know the essential parts of the plan, and would use their own initiative to change the details or to devise other details to execute the essential parts.

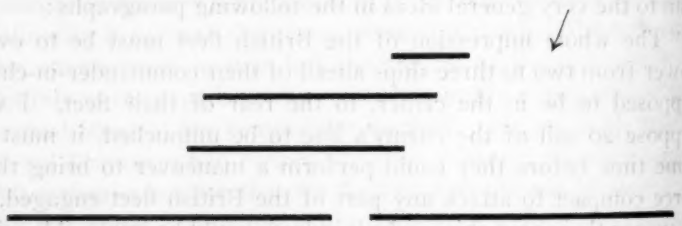
"If the van of the enemy tacks, the captured ships must run to leeward of the British fleet; if the enemy wears, the British must place themselves between the enemy and the captured; and should the enemy close, I have no fears as to the result."

These instructions seem unnecessary, if the captains were educated in tactics.

"The second in command will in all possible things direct the movements of his line, by keeping them as compact as the nature of the circumstances will admit. Captains are to look to their particular line as their rallying point. But, in case signals can neither be seen nor perfectly understood, no captain can do very wrong if he places his ship alongside that of an enemy."

This gives general instructions to the second in command and to the captains, and most wisely allows them a wide initiative.

"Of the intended attack from to windward, the enemy in line of battle ready to receive an attack,



"The divisions of the British fleet will be brought nearly within gun shot of the enemy's center. The signal will most probably then be made for the lee line to bear up together, to set all their sails, even steering sails, in order to get as quickly as possible to

the enemy's line, and to cut through, beginning with the twelfth ship from the enemy's rear. Some ships may not get through their exact place, but they will always be at hand to assist their friends; and if any are thrown around the rear of the enemy, they will effectually complete the business of 12 sail of the enemy.

"Should the enemy wear together, or bear up and sail large, still the 12 ships composing, in the first position, the enemy's rear are to be the object of attack of the lee line, unless otherwise directed from the commander-in-chief, which is scarcely to be expected, as the entire management of the lee line, after the intention of the commander-in-chief is signified, is intended to be left to the judgment of the admiral commanding that line.

"The remainder of the enemy's fleet, 34 sail, are to be left to the management of the commander-in-chief, who will endeavor to take care that the movements of the second in command are as little interrupted as possible."

As the attack was actually made from to windward, let us see how this plan actually worked out in the battle.

The plan was not to be made without a signal to do so after the dispositions of the enemy were seen. Also this plan was for but one of the squadrons. The initial move was planned, the maneuvers of his own line were left by Nelson until the countermoves of the enemy were seen.

As is evident from the sketch drawn by Nelson, the fleet was to be formed in three lines opposite the enemy's center. The attack was actually made in two parallel columns. Collingwood's squadron was to come into action with all its ships at one time. The ships did come into action in succession, allowing the Allies to concentrate on the leading ships. Next the order says: "Should the enemy wear together . . . . still the 12 ships composing, in the first position, the enemy's rear are to be the object of attack of the lee line." Mahan says: "At *20 minutes before seven* Nelson made in quick succession the signals to form the order of sailing and to prepare for battle. *Ten minutes later* followed the command to "bear up." . . . . The two columns steered east about a mile apart, that of Nelson being to the windward. . . . . When the development of the British maneuver was recognized by Villeneuve he saw that fighting was inevitable, and wishing to keep Cadiz under his lee, he ordered the combined fleets to wear together. . . . . Their ships which had been head-

ing south, now all headed north; the van became the rear. . . . . Nelson, however, noting its beginning at *seven with grave concern.*" Therefore as the approach began, Collingwood was on the flank toward the van of the enemy and Nelson noted the maneuver of the enemy "*with grave concern,*" which maneuver was to allow Collingwood to attack the rear, as the Memorandum required. "The 12 ships composing, in the first position, the enemy's rear" were never attacked. The Memorandum implied that the movements of Nelson's line were to be delayed until the effect of Collingwood's attack was apparent. In the action the attacks of the two lines were made simultaneously. Also during the approach Nelson signalled: "I intend to pass through the van of the enemy's line to prevent him from getting into Cadiz." Later he sent officers to tell the rear ships to get into action as quickly as possible, regardless of the prearranged plan, and he also gave authority to Blackwood to order in his name any movements of the rear ships that he thought advisable. Thus not one detail of the prearranged plan was executed as ordered. The light winds have been held responsible for the failure of these details, but does not Nelson say at the beginning of the Memorandum: "Thinking it almost impossible to bring a fleet of 40 sail of the line into a line of battle in *variable winds,* thick weather and other circumstances that may occur"? The essential part of Nelson's plan, to concentrate his force on an inferior number of the enemy, succeeded, but all the details prearranged were either discarded or changed.

On the French side the van lacked initiative to come to the aid of the center and rear, and did not enter the action until ordered by the commander-in-chief, and then did not come to close quarters with all its force concentrated. The action of the four ships in the center which wore out of the line is explained as an attempt to aid the rear ships. Such action is almost incredible. Initiative used in this way is most injurious, and such a weird decision in this case shows how little the Allied officers were educated in tactics.

The battle of the Sea of Japan was fought between the Russians, under Rodjestvenski, and the Japanese, under Togo, May 27, 1905. The Japanese forces were organized as follows: First division, Admiral Togo, four battleships, two armored cruisers; second division, Admiral Kamimura, six armored cruisers; third

division, Admiral Dewa, four protected cruisers; fourth division, Admiral Uryu, four protected cruisers; fifth division, Admiral Kataoka, four protected cruisers; sixth division, Rear-Admiral Togo, four protected cruisers; first, second, third, fourth and fifth destroyer flotillas (four destroyers in each); first, ninth, tenth, eleventh, fourteenth, fifteenth, sixteenth, seventeenth, eighteenth, nineteenth and twentieth torpedo-boat flotillas (four boats each).

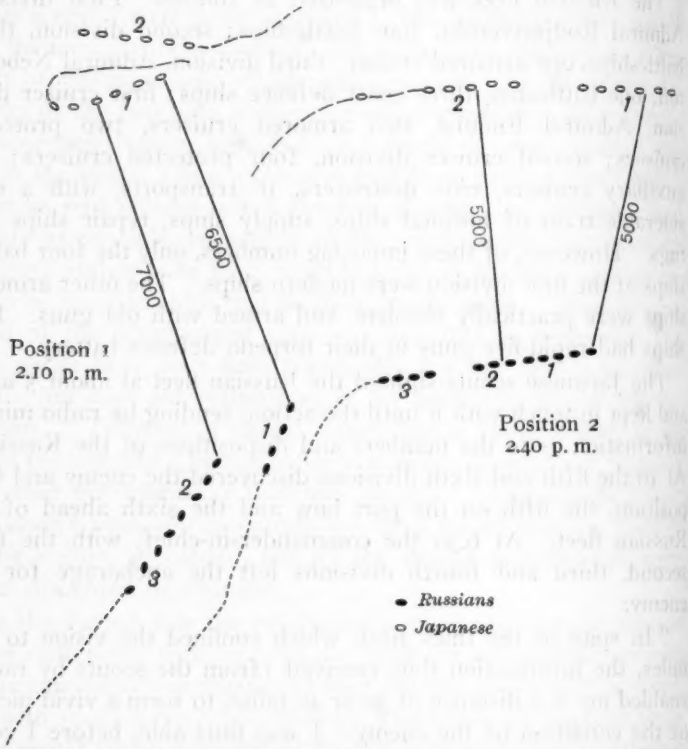
The Russian fleet was organized as follows: First division, Admiral Rodjestvenski, four battleships; second division, three battleships, one armored cruiser; third division, Admiral Nebogatoff, one battleship, three coast defence ships; first cruiser division, Admiral Enquist, two armored cruisers, two protected cruisers; second cruiser division, four protected cruisers; five auxiliary cruisers, nine destroyers, 16 transports, with a considerable train of hospital ships, supply ships, repair ships and tugs. However, of these imposing numbers, only the four battleships of the first division were modern ships. The other armored ships were practically obsolete, and armed with old guns. Few ships had rapid-fire guns in their torpedo defence battery.

The Japanese scouts sighted the Russian fleet at about 5 a. m. and kept in touch with it until the action, sending by radio minute information as to the numbers and dispositions of the Russians. At 10 the fifth and sixth divisions discovered the enemy and took position, the fifth on the port bow and the sixth ahead of the Russian fleet. At 6.30 the commander-in-chief, with the first, second, third and fourth divisions left the anchorage for the enemy.

"In spite of the thick mist, which confined the vision to five miles, the information thus received (from the scouts by radio) enabled me at a distance of 30 or 40 miles, to form a vivid picture of the condition of the enemy. I was thus able, before I could see the enemy with my own eyes, to know that the enemy's fighting sections comprised the whole of the second and third squadrons; that they were accompanied by seven special service ships at their rear; that the enemy's ships were disposed in double column formation; that their main strength was placed at the head of the right column; that the enemy's speed was about 12 knots; that the enemy were steaming in a northeasterly direction. On the strength of this information I was able to form a mental resolution to meet the enemy with the main strength of my fleet near

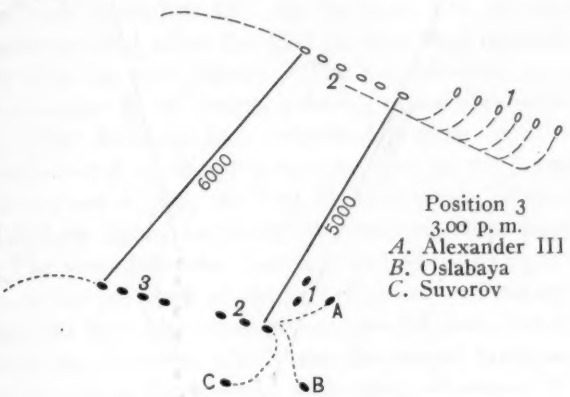
Okinoshima at about 2 o'clock in the afternoon, and open the attack on the head of the enemy's left column." (Togo's Official Report.)

The first division, in column formation, followed closely by the second division, headed southwest to get on the port side of the enemy, as soon as the latter were sighted at 1.40 p. m. At 2.05 the first division countermarched toward the enemy, followed by the

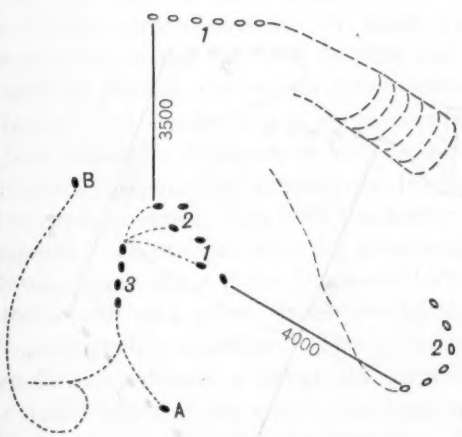


second division. At 2.08 the Russians opened fire. (Position 1.) At 2.10 the Japanese commenced firing, two ships of the first division concentrating on the *Suvorov,* leader of the right column, at ranges from 6400 to 7000 meters, and four on the *Oslabaya,* at ranges from 5800 to 7000 meters, each ship opening fire as soon as the turn was completed. At 2.11 the second division commenced the turn, each ship, as the turn was completed and it was steadied on course ENE., opening fire. One ship concentrated on the *Suvorov,* three on the *Oslabaya,* leader of the left column, and two

on the *Nikolai I,* at ranges from 5400 to 6000 meters. A large part of the Japanese fire was therefore directed on the two leaders of the Russian columns. These columns both changed course slightly to starboard, forming one long irregular column. Both fleets gradually changed course to starboard, the Japanese drawing

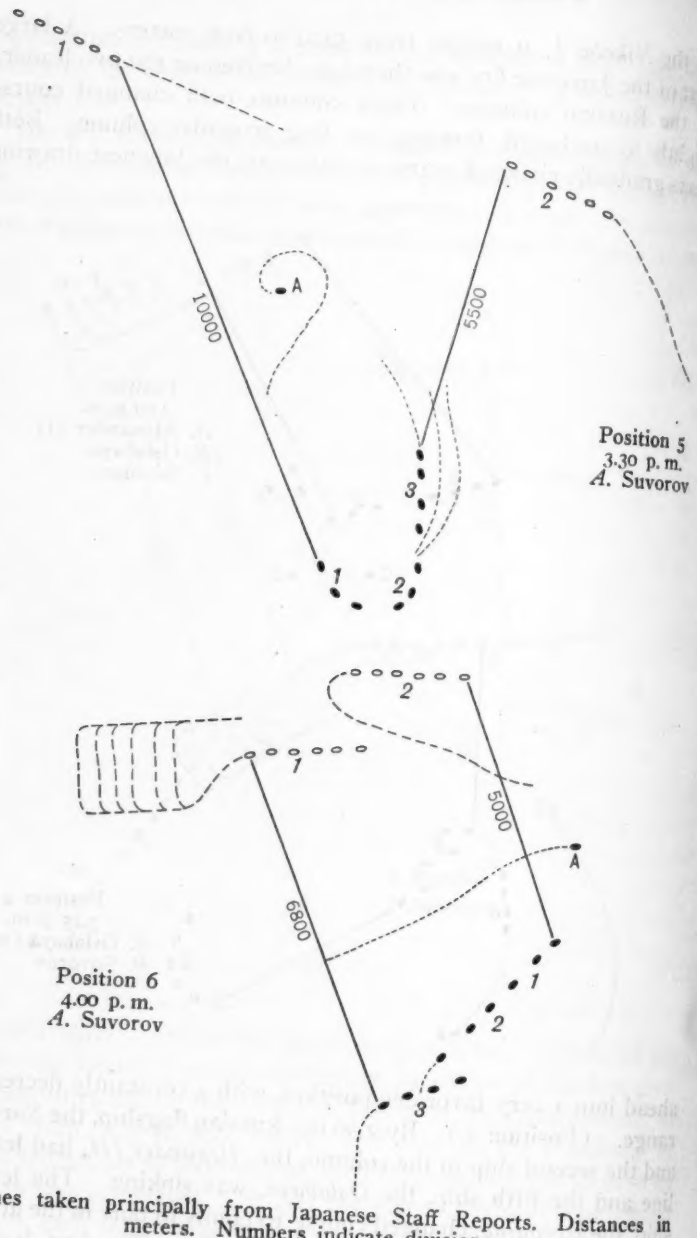


Position 3
3.00 p. m.
A. Alexander III
B. Oslabaya
C. Suvorov



Position 4
3.15 p. m.
A. Oslabaya (sunk)
B. Suvorov

ahead into a very favorable position, with a constantly decreasing range. (Position 2.) By 2.50 the Russian flagship, the *Suvorov,* and the second ship in the column, the *Alexander III,* had left the line and the fifth ship, the *Oslabaya,* was sinking. The leading ship, the *Borodino,* changed course 10 points to port in the attempt to escape past the rear of the Russian fleet. The first Japanese division went "ships left about," and formed column with



Sketches taken principally from Japanese Staff Reports. Distances in meters. Numbers indicate divisions.

BATTLE OF THE SEA OF JAPAN, MAY 27, 1905

the rear ship, the *Nisshin,* leading on course WNW. The second division did not follow this maneuver, and their position ahead of the enemy's column forced the Russians to change course to starboard. (Position 3.) This division also changed course gradually to starboard, forcing the enemy to continue turning until they were headed south. At this time, 3.10, the second division countermarched after the first division and opened fire on the enemy with the port battery. The first division, at 3.07, as soon as it was clear of the second division, opened fire with the port battery. The Russians had continued turning in a circle until they were headed northeast across the rear of the Japanese divisions. Therefore at 3.30 the first division went "ships left about," the *Mikasa* again becoming the leading ship, heading about east. The second division countermarched to the right and took position on the port bow of the first division. (Position 6.) From this time the fight was continued on parallel lines, fire being concentrated on the *Suvorov,* which was discovered between the lines at about 4, and at the Russian main fleet, whenever it was visible. At 4.45 attacks were made on the *Suvorov* by two destroyer flotillas without success. At about 4.40 the main Russian fleet was lost in the fog, and the first and second divisions headed south in pursuit, the second division leading.

"On receipt of the order at 2 p. m. to commence fighting, the Dewa, Uryu and Togo divisions, as well as the cruiser squadron (fifth division), separating themselves from our main fleet, steamed south in reversed lines with the enemy on the port side, and threatened in accordance with the prearranged plan, the rear of the Russian fleet. At 2.45 the Dewa and Uryu divisions, maintaining touch with each other, first opened fire in reversed lines on the Russian cruiser squadron. The joint attack of the Dewa and Uryu divisions showed a remarkable development by 4 p. m. The rear detachments of the enemy had been completely routed, and had become separated from one another. By 4.20 the cruiser squadron (fifth division) and the Togo division had arrived and they at once joined the Dewa and Uryu divisions in attacking the already routed Russian cruisers and special service ships. At 4.40 four Russian battleships (or coast defence ships) arrived and joined the Russian cruisers, so that the Uryu detachment and the cruiser squadron were for a short time engaged at a short range in an arduous fight with a powerful enemy." (Togo's Official Report.)

When the main Japanese fleet lost the enemy in the fog, the Japanese cruisers probably met his third division. At 5.30 Kamimura, hearing the sound of heavy guns in the fog, left, on his own initiative, his position ahead of the first division, and headed toward the battle. He encountered the main body of the Russians and eight cruisers, which he attacked with his starboard battery. The first division discovered the enemy at 6 and opened fire on them with the port battery. The action continued until dark, the *Alexander III* being sunk and the *Borodino* blown up. At 7.20 the *Suvorov* was attacked and sunk by the eleventh torpedo flotilla. At nightfall only nine ships of the Russian fleet remained in an organized body. These, commanded by Nebogatoff, headed for Vladivostok. The Japanese destroyer and torpedo-boat flotillas attacked during the night, and dispersed the Russian ships, except two battleships and two coast defence ships, which surrendered without resistance the following morning. The victory of the Japanese was complete.

The Japanese system was remarkable, in that the greatest initiative was allowed to all subordinates. The efficient co-operation of the various divisions and flotillas proves that the officers were most thoroughly educated in tactics. This action can be compared with Trafalgar for the extremely small number of orders issued by the commander-in-chief. The organization of the Japanese fleet was simple, there being six divisions, to all of which destroyer or torpedo-boat flotillas were attached. This detail of the flotillas does not seem to offer the difficulties of control that will be sure to occur if they are massed in one large flotilla of 30 to 50 boats, under the command of one man. The flotillas were attached to divisions as follows:

First division: First and third destroyer flotillas.

Second division: Second, fourth and fifth destroyer flotillas.

Third division: Ninth and fourteenth torpedo flotillas.

Fourth division: Nineteenth torpedo flotilla.

Fifth division: Eleventh, sixteenth, seventeenth, eighteenth and twentieth torpedo flotillas.

Sixth division: Tenth and fifteenth torpedo flotillas. These flotillas seem to have attached themselves to other divisions during parts of the day battle.

Upon receipt of the news that the Russian fleet was discovered, " the different sections at once commenced their hostile operations along the lines respectively laid out for them in the prearranged

plan." (Togo.) "Admiral Kataoka, with the third fleet, was at Ozaki Bay, and when he received the report (the enemy sighted) transmitted it to the commander-in-chief, Admiral Togo. At the same time he ordered his command to prepare for action. The sixth division . . . . got under way at 5.44 (the enemy was first sighted at 4.45). At 5.05 a. m., the commander of the second fleet, when he received the report, ordered his command to get under way." (Staff Report.) The plan for keeping in touch with the enemy, after he was discovered was prearranged.

At the beginning of the action "the Dewa detachment, the Uryu detachment, the cruiser squadron and the Togo detachment, in pursuance of the previous arrangement, steamed to the south and came upon the rear of the enemy." (Togo.) The first two detachments carried out the plan promptly. The last two must have been slow. "The fifth and sixth divisions were ordered by the commander-in-chief, Admiral Togo, to attack the enemy's rear." (Staff Report.) After this order all the cruiser divisions acted entirely on their own initiative.

The commander-in-chief reserved for himself the control of the first and second divisions alone. His control over the second division was throughout the action very slight, Admiral Kamimura acting on his own initiative, guided by the general idea of keeping within supporting distance of the first division, which he had evidently been instructed to do. Togo's only signals to the second division were to change course to northwest by north at the beginning of the action in order to get on the port side of the enemy; the signal to commence the action; the general signal to the fleet "The fate of the Empire depends on this battle, let every man do his utmost"; the order for the second division to take position ahead of the first division at 5 and the signal for all ships to cruise north after the action and gather at Utsuryoto. Admiral Kamimura did not hesitate to leave his position astern of the first division when he thought it best to. "At 2.58 the first division changed course eight points to port, and the second division was about to follow them when they discovered that the leading unit of the enemy seemed about to change course to starboard, and in order to cut off their escape to the southward, the second division ceased this movement and, increasing their speed, passed astern of the first division, which was now in line abreast, headed toward the enemy and opened fire at the leading ship at a range of about 3000 meters." On the other hand, while the enemy was in fairly

good order he was careful not to get outside of supporting distance of the first division. "The range not only became greater, but the first division standing to the northward, it was feared that the divisions would become separated; therefore, at 4.47 the second division, turning to starboard, ran northwest with the intention of joining the first division." (Staff Report.) After the Russian fleet was defeated he did not hesitate to leave the first division altogether. "But on account of the severe fire on the starboard bow, Admiral Kamimura knew that the Japanese cruisers were engaged, and without engaging these two ships he separated his command from the first division, stood quickly toward the direction from which the firing came, and discovered the third and fourth Japanese divisions engaged with a unit of the enemy." (Staff Report.)

While the numerous turns together of the first division prove that Togo had a fairly close control over the ships of the first division, considerable initiative was left to the captains of these ships. "The range becoming shorter, hitting was more accurate, each ship changing her target as the circumstances warranted." (Staff Report.)

The third and fourth divisions co-operated with great efficiency. "Then changing course to port, they (fourth division) steamed north, and again at 2.10 p. m. changed course to northeast, intending to join the third division and to co-operate with them." "From now on this division, taking position inboard of the third division, worked in unison with this division." (Staff Report.)

The fifth and sixth divisions were at the beginning of the action combined under the orders of Admiral Kataoka. "At 2.25 p. m. the sixth division received orders from Admiral Kataoka to attack the enemy's transports, which appeared to the southward." Later the sixth division was ordered to act independently. "Admiral Kataoka ordered the sixth division to operate at will."

The destroyer and torpedo flotillas sometimes acted independently and sometimes under the orders of the division commanders. "At 2.30 orders were received from the commander-in-chief, Admiral Togo, for the destroyer flotillas to operate at discretion outside of battle range. . . . . As the second division passed about 2000 meters from the *Suvorov,* the commander of the fifth destroyer flotilla deemed it a good opportunity for attack." (Staff Report.) "At this time the third destroyer flotilla joined

the third division, but on account of the weather Admiral Dewa ordered this flotilla to operate independently." (Staff Report.) On the other hand, "The eleventh torpedo flotilla received an order from Admiral Kataoka to attack the *Suvorov*." At sunset the division commanders signalled for the destroyer and torpedo flotillas to attack. The attack was made by flotillas in succession; in some cases flotillas were divided and the boats attacked separately.

Togo's system of command was as follows:

1. General prearranged plan for keeping in touch with the enemy as soon as they were sighted. This plan designated the objects of attack for the various divisions when the action commenced, but not the tactical details of the attack.

2. Plan for the main fleet to be made after the dispositions of the enemy were known.

3. Great initiative granted to the cruiser division commanders, who were allowed to decide upon their plan of attack, after the dispositions of the enemy cruisers and special service ships were known. Great initiative was also granted to the commander of the second division, whose only instructions evidently were to keep within supporting distance of the first division. Considerable initiative was also granted to the captains of ships, who were allowed to select and change their targets at will.

4. Co-operation between the divisions. That of the first and second divisions was perfect, and that of the third and fourth divisions was very good. The fifth and sixth divisions seem to have been unable to find the enemy until the action was nearly over. The Japanese officers must have been most carefully educated in tactics.

The Russians seem to have had no other system of command than that of following the leading ship. At different times the following ships acted as the leader: *Suvorov, Alexander III, Borodino* and *Orel*. The captains of these ships, after Rodjestvenski was wounded, all acted at times as commander-in-chief. There seems to have been no divisional control of the ships. Without divisional control, no other formation could be used than the long irregular column, and the only maneuver that could be used was a change of course in succession, in this case usually away from the enemy, because the latter had the superior speed. The Russian captains seem to have shown excellent initiative,

leaving the line to put out fires and make repairs, and returning again as soon as they were in commission. Several times the Russian fleet was in a state of complete confusion, but each time as soon as there was a lull in the fighting, the ships were again rallied into formation.

The two cruiser divisions do not seem to have been able to keep the ships that composed them together in one body. They and the special service ships and destroyers seem to have been scattered all over the scene of action. The captains of many of these ships acted in a most efficient manner, and considering the vastly superior numbers of the Japanese cruisers and destroyers, seem to have stood off the attack of the enemy as well as could have been expected. In addition many of these ships rescued many men from the sinking battleships, standing by them in a most creditable manner. After sunset Admiral Enquist, in obedience to secret orders from the commander-in-chief, withdrew with his four ships from the battle, seeing that they could be of no further use. At 5.30 p. m. Admiral Rodjestvenski, being rescued from the *Suvorov* by a destroyer, dispatched another destroyer to Admiral Nebogatoff on the *Nikolai I*, ordering him to steer to Vladivostok. Nebogatoff signalled to the ships near him: "Follow me; course N. 23° E.," and rallied the remaining ships. After the torpedo attacks during the night only four ships remained in sight the next morning. Upon the approach of the whole Japanese fleet these ships surrendered, further resistance being useless.

From the various actions we have examined we have seen that many systems of control have been used. These can be tabulated as follows:

1. Direct control of the commander-in-chief over the whole fleet. Example: Howe and Villaret in the action of May 29.

2. The fleet controlled by a definite prearranged plan. Example: Nelson at Copenhagen.

3. Probable plan prearranged and issued to the fleet with the understanding that this plan is not to be executed until signal is made after the dispositions of the enemy are known. Examples: Nelson at Trafalgar and Suffren in the action of February 17.

4. The captains instructed in tactics and in the tactical ideas of the commander-in-chief, and general instructions issued for the guidance of subordinates. Examples: Nelson at the Nile and Trafalgar, and De Ruyter at the actions of Southwold Bay and the Texel.

5. General plan signalled to the fleet after the dispositions of the enemy are known. Examples: Nelson at the Nile and Trafalgar, De Ruyter at Southwold Bay and the Texel, Togo at the Sea of Japan.

6. General plan executed by the subordinates acting on their own initiative. Examples: English at the Nile and Trafalgar, and Japanese at the Sea of Japan.

7. Control by the example of the flagship. Examples: Howe and Villaret in the action of May 29, Togo and Rodjestvenski at the Sea of Japan.

8. Control of the commander-in-chief over a squadron (as a squadron commander) or over a few ships near the flagship. Examples: Tourville at Beachy Head, Nelson at Trafalgar, De Ruyter at Southwold Bay and the Texel and Togo at the Sea of Japan.

Of the actions we have considered but one, the Sea of Japan, was a battle in which the present conditions of a naval action were present. I will compare the difficulties of the commander-in-chief in exercising direct control over his fleets to-day with those present in the actions of sailing ships.

The following conditions tend to make the control of the commander-in-chief in action easier to-day than in the days of sailing ships:

1. The fighting being at a longer range the commander-in-chief will not have the same difficulty of seeing the maneuvers of his squadrons, which were often mixed up with the enemy's ships in a mêlée in the actions of sailing ships.

2. The use of smokeless powder also makes it easier for the commander-in-chief to trace the movements of the enemy and of his own squadrons.

3. Radiotelegraphy has improved signalling. The efficiency of this method of signalling is not as yet proved, having never been tried out in action.

The following conditions tend to make the control of the commander-in-chief more difficult to-day:

1. The great speed of modern ships and their quickly changing positions make it imperative that signals be read and obeyed immediately, or the conditions will have changed, possibly making the maneuver signalled inadvisable.

2. The extremely short time required for the decision of the battle does not give the commander-in-chief time to make new

dispositions of his forces. However, after the action is decided the commander will have time to give orders for the pursuit of the enemy.

3. The greatly increased power of modern guns will probably cause the signalling apparatus to be wrecked and the masts and yards to be carried away early in the action.

4. The increased area occupied by a large fleet and the addition to the main fleet of destroyers, submarines and mine layers, while in the fights between sailing ships only ships of the line were engaged.

5. The increased range makes mist or fog more liable to conceal the enemy from the view of the commander-in-chief.

6. The smoke from stacks increases smoke interference. This especially applies to the smoke screen of destroyers.

These conditions would seem to prove that it is at least as hard for the commander-in-chief to control directly the fleet to-day as it was in the days of sailing ships, and probably harder.

We will now consider the methods of control that can be used in an action to-day, and try to determine their advantages and disadvantages.

We will first consider the method of direct control by the commander-in-chief over the entire fleet. In order to efficiently control the fleet the commander-in-chief has first to know the positions of his own fleet and the positions of the opposing fleet at all times. He must be able to transmit to the ships of his fleet orders which must be obeyed before the conditions have changed. These two essentials have led to the concentration of all the ships of the first line of battle into one body, so that their positions are known to the commander-in-chief exactly at all times, and the efficiency of signalling is increased, and the commander-in-chief is able to control his fleet by example. This method has been tried many times in the past and has been used to advantage before fire was opened, but has always failed after the action was commenced. We have seen how both Howe and Villaret lost control of their fleets and had to control by example to partly carry out their wishes. Also in the battle of the Saints both Rodney and De Grasse lost all control over their fleets, De Grasse in particular making signal after signal that could not be received or obeyed. In the battle of Ushant, D'Orvilliers lost control over his van when there was the opportunity for an excellent maneuver. In many of the actions between Suffren and Hughes both commanders lost

control. It will be noticed how De Ruyter and Nelson discarded this method as useless, the latter beginning his Memorandum as follows: "Thinking it almost impossible to bring a fleet of 40 sail of the line into a line of battle." In our latest action we see Togo exercising control over but six ships and a most nominal control over six more, the rest of his fleet being almost entirely out of his sight during the action. In the action of sailing ships where the fleets were formed in one long column, the commanders-in-chief always took position in the center of their column, so that signals for simultaneous maneuvers could be easiest sent to the fleet. These maneuvers rarely succeeded after the fleets were in touch, and have to-day been entirely discarded for a large number of ships in one line under fire. Speaking of the Japanese the *Marine Rundschau*, August, 1912, says: "Never did more than six ships turn together; never did they make a turn after they had all suffered severely; never at any time when they were hard pressed by the enemy and they were themselves locked fast to him." Maneuvers in succession are now alone attempted when there are a large number of ships in one formation, and therefore the flagship is placed at the head so that control by example may be used, and in order that this control may be used the control by signals is made more inefficient. Therefore the control of the commander-in-chief is limited to changes of course in succession, which means that he has practically no control at all, and as the fire will usually be concentrated on the leading ship, if the flagship is in this position, it is likely that even this control will not last long. The many disadvantages of the long column will be sufficient to counterbalance the advantage of this control, if it be any advantage. "A squadron should therefore consist of eight ships or at most 12. Beyond that number of ships it would not seem possible to prescribe rules for attaining unity of control and unity of action, at least not without involving the difficulties of a double column. Hence in such cases it would be advisable to form two squadrons which should maneuver separately but co-ordinately." (Bernotti.)

If the fleet be divided into two or more squadrons that maneuver separately, it will be even more difficult for the commander-in-chief to exercise his control. In order to attempt this control most efficiently it would seem advisable for the flagship to be a small fast vessel out of the battle line. Here the commander-in-chief could see most clearly the situation, and his signals could be sent to the squadron commanders with more success. However,

when we consider the speed with which ships change their positions, the number and different classes of ships engaged, the quickness with which the action is decided, the area covered by a large fleet and the corresponding parallax introduced in the view of the commander-in-chief, the smoke interference, it must be admitted that his control is indeed difficult, if it is possible at all. Will it even be advisable to control the fleet from such a distance that it is impossible to know the actual conditions? Should we follow the example of Parker at Copenhagen?

Because it is impossible to guess the conditions under which the enemy will be met, it is manifestly unwise to issue a definite prearranged plan, except possibly for a case where shore batteries are to be engaged or an enemy that cannot change his position. However, even in this case we have seen the failure of the plan at Copenhagen, which shows that it is undesirable to prescribe the details of action for each ship.

With the innumerable combination that may arise in an action to-day, is it probable that a commander-in-chief will be able to find the conditions favorable for the execution of a plan prepared weeks in advance? If Nelson failed so completely to use his prearranged plan at Trafalgar where he knew that the Allies were practically unable to maneuver, and actually made no offensive move, and were not even able to keep in position, what chance is there to-day that any one single prearranged plan can be executed?

While definite plans can hardly be prescribed in advance, there are many other things that can be done. The most important is the education of the admirals and captains in tactics, and in the tactical ideas of the commander-in-chief. All situations should be covered, and thought out carefully to determine the most advisable moves in such situations. The commander-in-chief should impart to his subordinates his ideas, in order that all may think in the same lines and will know ahead of time what the commander-in-chief intends to do. "Troubridge, anticipating the order, had already hoisted at the masthead his answering flag of recognition. Quick as the admiral's signal flew, the reply fluttered out, and the *Culloden's* sails were already shaking as she luffed up into the wind."

There are many definite instructions that can be arranged before the action. These should apply to all ships and to all conditions. These are: Formation of the ships; their division into squadrons; the object of attack of the squadrons and the various classes of

ships, as given by Togo before the action; recognition lights for a night action; careful arrangement of the signals; plans for the concentration of gun-fire, and for the distribution of the gun-fire of our ships among the targets within range. These prearranged instructions should be of two classes: First, details that apply under all conditions, as Nelson's instructions "Captains are to look to their particular line as their rallying point. But in case signals can neither be seen nor perfectly understood no captain can do very wrong if he places his ship alongside that of an enemy"; second, a prearranged plan of minor tactics that can be indicated by a short signal from the squadron commander, as the plan for the concentration of the gun-fire of a squadron or division on a portion of the force of the enemy directly opposed to it.

We have noticed in most of the naval actions considered, that the commander-in-chief has not decided upon his final plan until the dispositions of the enemy were known. The advantage of this is even greater to-day than in the days of sailing ships, because there are to-day many classes of ships in the battle, and these are not dependent on the wind for their ability to maneuver. After the dispositions of the enemy are known there is plenty of time to issue the general plan of action. This plan should be as short and concise as possible, it should only show the main essential principles of the plan. The details of action by subordinates should not be prescribed. It should be assumed that the subordinates are sufficiently trained in tactics to provide in their own sphere of action for all conditions that may arise. In commenting on the Franco-Austrian War of 1859 Prince Hohenlohe says: "We find instructions filling six closely printed quarto pages, and all are about the same length. Everywhere, owing to changes, as many as three or four orders are issued on the same day. Who, I ask you, will read all this matter? How much time must elapse before these orders were read and understood, and then transmitted and executed? In war it is of the utmost importance to be as sparing of words in instructions and orders as of human lives in battle, or of detaching troops. For the longer the orders, the more difficult they are to understand. In looking over the orders under discussion we find that their length was due mainly to two reasons: First to their dealing with arrangements so many days in advance, and for so many different cases; secondly, because a mass of minor details were gone into which were partly matters of ordinary routine, and partly the concern of the different corps

and divisions." Later, in the War of 1870, the Prussian order "To the third army as to the offensive movement which was to prevent MacMahon from crossing the Rhine, and protect Baden from invasion, and which led ultimately to the battle of Woerth, consisted of a telegram of six lines."

We have already seen the many difficulties of the direct control of the entire fleet by the commander-in-chief. The impossibility of this method of control forces the squadron commanders to act on their own initiative after the action commences to carry out, as far as possible, the original instructions of the commander-in-chief. Not only is this initiative necessary, but it is advisable. In order to act as efficiently as possible, the commander must know the actual conditions and then he must make the decision and act immediately. The squadron commander must know more of the conditions in his part of the battle than the commander-in-chief will know at a distance. Although the squadron commander should watch the progress of the action in general, so that he may co-operate with the other squadrons, he will be watching his own squadron and the force of the enemy directly opposed to it. He will know the conditions in his own squadron, its maneuvering abilities, its actual speed, and the injuries its ships have sustained. He will know the condition of the enemy he is opposed to and will at once notice any change in their plan of action. Although he should signal information to the commander-in-chief, if this is possible, concerning the conditions in his part of the action, these signals, even if received correctly, will not give the commander-in-chief the detailed information that the squadron commander can see with his own eyes. Also these signals will take some time in being transmitted, and the information in the possession of the commander-in-chief will always be late. If the latter orders maneuvers based on these signals of information, they will be received by the squadron commander even later, and the chance for a good maneuver may be lost, or what might then have been a good move will now be a poor one, due to the changed conditions. To take advantage of favorable situations the subordinate must act immediately. If he were to inform the commander-in-chief of the favorable conditions, and to ask permission to make the movement he wished to make, before the signal could be returned, even if it could be made and returned, the conditions would probably have changed and the chance would be lost. Henderson

says: "Again, officers not in direct communication with headquarters, were expected not only to watch for and utilize, on their own initiative, all opportunities of furthering the plan of campaign or battle, but, without waiting for instructions, to march to the thunder of cannon, and render prompt assistance wherever it might be required. . . . . In executing the orders of the supreme command, the subordinate leaders not only did over and over again more than was demanded of them, but surpassed the highest expectations of their superiors, notably at Sedan. It often happened that the faults, more or less inevitable, of the higher authorities were repaired by their subordinates, who thus won for them victories which they had not always deserved. In a word, the Germans were indebted to the subordinate leaders that not a single favorable occasion throughout the entire campaign was allowed to escape unutilized."

To make sure that the initiative will be properly used and that the squadrons will co-operate with each other efficiently, it is necessary that the subordinate officers be educated in tactics and in the tactical ideas of the commander-in-chief. In order that there may be a unity of purpose, the subordinates must use their initiative to further the general plan of the commander-in-chief, issued before commencing the battle. However, certain maneuvers of the enemy, or misfortunes to our fleet may make the general plan unwise. In this case, it would be unwise to attempt to continue the original plan, and if other instructions are lacking the squadron commanders must act as they think best under the circumstances.

At times in an action it may be advisable to control the fleet or a squadron of the fleet by the example of the flagship. Togo in this way exercised a loose control over his 12 armored ships. Although he had no control over the tactical details of the second division, this division followed Togo's lead, but in a different way. In controlling a squadron or a division of from four to eight ships, control by example can be used most efficiently, especially if it is realized that it is not important for ships to be exactly in position.

Throughout the action the commander-in-chief may exercise control over a squadron or over a few ships that may happen to be near him. In nearly all actions the commander-in-chief has reserved a division for his own, in this way acting as a squadron commander. Now, however, all fleets have a fleet flagship, and the commander-in-chief does not take command of a division or

squadron. After the action is decided, or during a lull in the action, the commander-in-chief may again exercise control over the fleet, directing the pursuit, if victorious, and rallying the fleet around his flag, if defeated, as did Villaret after the battle of June 1, and Gravina after Trafalgar.

Through an examination of many naval actions of the past, and a study of the conditions of the naval action to-day, the following method of control seems to be most advisable:

1. Education of subordinates in tactics, and especially in the tactical ideas of the commander-in-chief. Officers must, to a great extent, give up their private opinions and agree with those of the commander-in-chief, so that there will be but one system of tactical ideas. This is necessary for the unity of action of the squadrons of the fleet.

2. General prearranged instructions concerning the details of handling ships, signals and organization, which will apply at all times, and plans of minor tactics for squadrons which can be indicated by a simple signal in action. There must be no one tactical plan definitely ordered, or even issued as probable, nor any detailed list of the plans to be used in the various special cases that may arrive in action. (Clausewitz.) "There are always only three cases possible, and when all these have been provided for, the fourth invariably happens." The mind of the commander-in-chief must remain open until the dispositions of the enemy are known.

3. The commander-in-chief should signal his general plan of action after he knows the dispositions of the enemy. This plan should not be changed unless some new maneuver of the enemy makes it necessary. "Hence in war it is better to undertake something with firm determination, than to vacillate hither and thither, order, counter-order, disorder." (Prince Hohenlohe.) The plan of the commander-in-chief should be concise and should not specify details. These should be left to the subordinates.

4. The plan should be executed loyally by the subordinates, using their own initiative in maneuvering their own squadrons and flotillas, until such a time as the plan is no longer possible, due to changed conditions, when they should maneuver and co-operate with each other as they think most advisable.

5. The commander-in-chief, after the action is decided, should use his control to force the pursuit, if victorious, or to rally his ships and make good his retreat, if defeated.

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NAVAL SCOUTS

THEIR NECESSITY, UTILITY, AND BEST TYPE

By COMMANDER RALPH EARLE, U. S. Navy

The writer realizes that this subject is as old as the hills, and that it has been presented to the service via the War College in a very thorough way by the officers there stationed, who can and do devote a larger amount of time to the subject than is possible for those elsewhere, but he also deems that not enough importance is given to the need of scouts in our navy programs, even in those submitted by our general board from year to year, and so is not adverse to reviving the discussion.

Since 1904 the general board has recommended altogether a total of 34 scouts, the department has recommended 14, and Congress has granted three. From 1908 to 1912 the general board has consistently recommended a program of four battleships, four scouts, 16 destroyers, during which period one gunboat also was recommended. In 1913 and 1914 no scouts were advocated, but instead two gunboats were included each year. As will be referred to later on, scouts of the proper type are excellently adapted for carrying on practically all the gunboat duty and hence we certainly now have a sufficient number of gunboats suitable for doing any work that the scout cruisers cannot perform.

However, in the recommendations for new construction before the 63d Congress in the fall of 1914, we find the general board states that the fleet is peculiarly lacking in naval scouts "so necessary for information in a naval campaign, and of such great value in clearing the sea of torpedo and mining craft, in opening and protecting routes of trade for our own commerce, and in closing and prohibiting such routes to the commerce of the enemy," and that they recommended four scout cruisers as this branch of the fleet "has been too long neglected."

Many incidents in history plainly point out that naval commanders have dire need of information before they can hope to successfully injure an enemy's sea power, and their only means of securing such intelligence is by the utilization of vessels specially designed and adapted for naval scouts. While it is no doubt true that in battle we may not have to make use of our scouts as Nelson did of his frigates at Trafalgar—" ranged along the two lines, to repeat signals and assist crippled ships, were the British frigates and small craft "—nevertheless it does not require much imagination to picture a situation such that a similar use of our naval scouts—when we obtain them—will be valuable and will bear a great weight in the obtaining of a favorable issue of the battle.

A few maxims as to why we need scouts followed by a few historical instances of their value are in place at this point. Those of us who have only played at war, as in chart maneuvers at the college, admit that the delay and uncertainty of the transmission of intelligence from one point to another at sea is the greatest bar to our offensive enterprises.

" Armies pass through countries more or less inhabited by a stationary population, and they leave behind them traces of their march. Fleets move through a desert over which wanderers flit, but where they do not remain; and, as the waters close behind them, an occasional waif from the decks may indicate their passage, but tells nothing of their course. The sail spoken by the pursuer may know nothing of the pursued, which yet passed the point of parley but a few days or hours before."[1] " This difficulty of obtaining information at sea is apparent to all and in the game of hide-and-seek the advantage is with the sought, and thus the greatest importance accrues to the watch of the outlets of an enemy's country and stopping the chase before it gets away into the silent desert of the high sea. If such a watch is impossible the next best thing is, not attempting to watch routes which may not be taken, to get first to the enemy's destination and await him there, but then this knowledge of his intentions may not always be obtainable."[2]

Divisions of the French fleet did escape from time to time during the War of 1778 due to stress of weather and consequent

[1] Rear Admiral Mahan, U. S. N., in a Discussion of the War of 1778.
[2] Mahan's Influence of Sea Power on History.

absence of the blockading fleet, but the frigates always caught sight of and reported them, thus proving that frigates have an enormous strategical importance.

Nelson keeping his lookout ships off Toulon under Pellew claimed the port was not blockaded but the reverse, because he wished the enemy to come out provided he could watch their movements. His frigates would sight them, pass the signal from frigate to frigate until the main fleet was reached, and then the latter would be able to bring on the engagement.

The campaign of 1798, despite its brilliant ending at the Nile, is a case where failure nearly ensued, owing to the English having no force before Toulon when the French expedition sailed, and this was solely due to Nelson's being insufficiently supplied with frigates, for the lack of which he failed to secure the proper information.

The French defeat at Trafalgar was rendered possible by Villeneuve's lack of information of his enemy's force and location on his returning from the West Indies. This incident is perhaps not so well known as others and it therefore is here given more at length. The plan of the French was to effect a junction off Cape Ortegal with the squadron from Rochefort and then push on up the channel to cover Napoleon's invasion of England from Boulogne, Nelson then being a full week behind Villeneuve and headed for the straits. This plan failed, for, because of the lack of fast frigates, Villeneuve despatched but one, the *Didon*, which, forgetting its real mission, engaged and was captured by the *Phœnix*, thereby causing an absolute failure in the plans of campaign, and in consequence of this Napoleon's carefully planned invasion of England had to be abandoned.

Before the battle of Trafalgar the *Euryalus*, the British frigate nearest to Cadiz, signalled the getting under way of the Allied fleet at 7.20 the morning before Trafalgar, and this news repeated from ship to ship of the chain reached Nelson 50 miles away in the *Victory* at 9.20, but two hours later. With the modern radio chain of scout cruisers replacing this flag signal chain of frigates, methods of obtaining information have improved faster than the speed and free movement of fleets.

Lack of information caused the surprise of Commodore Johnstone in Porto Praya harbor (1781), and the defeat of his object in life by the resolute action of Suffren, who in thus taking the

English by surprise accomplished his mission even with his inferior force.

Lying in wait is hazardous and trying even when you know the point of arrival of the fleet, as is evidenced by Rodney's failures (1780 and 1782) to intercept the French convoys to Martinique. The reason again was the insufficient number of frigates.

Our failure in the Spanish War to locate Cervera before he entered Santiago was due to two causes, the primary one being the lack of scouts under the control of the commander-in-chief, while the secondary cause undoubtedly related to our lack of ability to use intelligently what we did have.

The success of the battle of Tsushima can be attributed in no small degree to the efficient work of Togo's few scouts under Admiral Dewa, whose converted cruiser *Shinano Maru* sighted the Russian *Dneiper* at 2.45 a. m. on May 27.

Von Spee seeking to acquire the English coaling station in the Falkland Islands saw, over the low neck of land forming the southern shore of Port Stanley harbor, but the one lone battleship lying there and therefore decided to risk an action. If he had had one modern scout with him, would he have been caught in the trap? We can but think that he certainly would not.

Thus history records many successes and failures of sea commanders due quite directly to the presence or absence of scouts.

Peace maneuvers repeat the lessens of history wherever a strategical problem is involved, as witness the failure of the English fleet in the 1913 maneuvers to prevent a raiding force descending upon their east coast towns. In just the preliminary search problem of our Atlantic fleet in January, 1915, two inferior forces were able to unite before either could be crushed by a fast powerful division operating with destroyers as scouts. A heavy sea obliged the destroyers, even though they were of our most recent 1000-ton class, to seek shelter for safety, thus abandoning the search in weather in which the battleships were having no difficulty in making 20 knots.

What is the proper designation for a vessel used for scouting? Early in 1913 the English Admiralty standardized their naval nomenclature by dividing their cruisers into three classes—battle-cruisers, cruisers, and light cruisers. The class known as cruisers includes the armored and protected first class cruisers, which subdivision in our service would include cruisers of 8000 tons or

above. Light cruisers include the others, exclusive of gunboats, and the name of "light cruiser" appeals to me as most appropriate, for a scout is more than a scout, doing the scout, the cruiser, and the gunboat work of peace and of war.

A scout cruiser, or using the better title suggested, a light cruiser, is not alone of value only as a scout but has a many sided rôle to play both in war and in peace. As part of a screen they protect the main battle fleet from hostile destroyers and thus preserve them for the main action. Professor Corbett says that not only is the screen of more importance than ever before in warfare, but that the light cruiser, in addition to being the eyes of the fleet, is just as important as a blindfolder of the enemy's eyes.

Reading Captain Labré's article[1] in the U. S. NAVAL INSTITUTE PROCEEDINGS, No. 153, I placed myself in my mind's eye as in command of our main—and only—battle fleet and endeavored to find for myself a method of procedure of adoption to solve his tersely put problems of strategy, and I still find myself groping in the dark and hopelessly handicapped for the complete lack of one essential fighting arm, *scouts*. As a practical case let us consider our fleet as the weaker awaiting the enemy on our own coast, we must take the offensive against him with such support as the coast affords, and we find that we must include among our operations the following:

(a) Send cruiser flotillas to harass and injure the approaching enemy while he is still at a distance from the coast.

(b) Employ our information service at long distance in order to learn of the approach and position of the enemy's attacking fleet and of its strength, composition.

(c) To hinder the enemy from gaining an advanced base, harass and fight his scouts and screen.

(d) To make night attack on enemy main fleet or engage it by day.

(e) Attack his reserves and convoyed train.

(f) To pursue predatory activities that will injure his commerce and communications while protecting our own.

How can we properly perform any of the missions above outlined without scouts of great speed, large cruising radius, and proper armament?

[1] Strategic Problems and Their Solution.

Battle-cruisers, the ideal scouts and offensive screen, are probably outside the question for this country on account of their great cost and the folly of building less than a homogeneous division of five, hence we must content ourselves with the best type of light cruisers that can be obtained. Battle-cruisers would best carry out the mission noted as (a). The light cruisers will seek out the enemy and permit our destroyers to act to the best advantage in reducing his daylight strength. In speaking of this destroyer attack so fatal to morale even if only partially successful one student says: "The attack can only be avoided by successful screening. An attack can only reach home as the result of successful scouting."[4] No true offensive screening can be successful except it is performed by battle-cruisers, as the requisite sought for in this operation is the destruction of the enemy's scouting force. To carry out (b), the light cruisers are requisite, and upon their successful performance may depend the fate of the nation's fleet. In order to properly prepare for the action we must have accurate information of the strength and formation of the enemy's fleet, and inasmuch as we desire definite information of our enemy so does that enemy require it of us, and our light cruisers will be used to protect our main fleet from the enemy's observation and will prevent the surprising of our own fleet. Light cruisers are very potent in locating and annoying an enemy train, convoy, or an expedition sent out to seize an advanced base, and conversely our navy has to *intercept* and overcome any convoyed force before a port suitable for a base could be secured and made defensible. It is impossible to determine in advance the objective point of attack of an enemy. The attacking and sinking of enemy transports under convoy is often of vital importance. The destruction of an enemy's train may defeat a whole campaign solely because the logistics of the enemy then become hopelessly confused. The mere obtaining of information is a very difficult problem, and the game board shows the little sea area that even the fastest scout can cover in the very best of weather, and what a mess a little fog makes even in that amount! The more one studies scouting the more one realizes that it is an art, and not only is it one not easily acquired, but it is one that requires actual sea experience to become proficient in, and this no matter how hard one may study supposititious cases and endeavor

[4] Lieutenant Commander W. S. Pye.

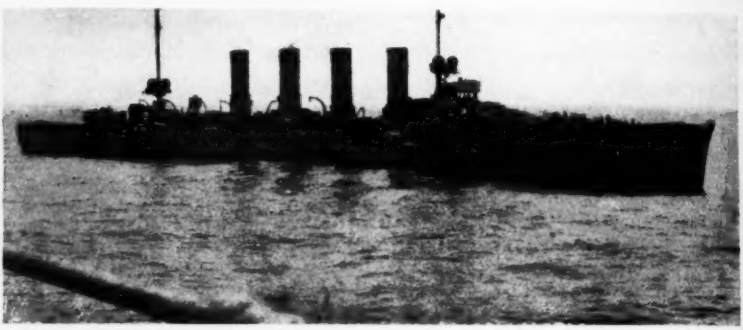
to acquire the quick decision and good judgment necessary to a scout commander.

Blockading is evidently as necessary now as formerly because the destination of an enemy's squadron is never known, but only its presence in a port so long as a blockade is kept. It is of the greatest moment to intercept an oversea expedition because it may be and probably is impossible to know at which point or at which two points the enemy aims. The enemy proceeds with full knowledge direct to his aim, if he can deceive us. The blockading thus, a military blockade purely, becomes the more difficult if the expedition is being assembled in two ports, and will require more vessels of the one class, light cruisers. The principle of the open blockade now seems to have forced its recognition upon the world, the main factor in thus forcing it having been the ability of submarines to keep the sea and thus render the close blockade an extremely hazardous undertaking without commensurate gain. The close blockade has always been the weakest and least desirable form of war, it requiring a much greater force than any other operation, and with such severe wear and tear on men and ships engaged in the same that at least one-fifth of the force should be refitting in port all the time. An open blockade requires a watch of the sea area included in the blockade by fast sea-keeping vessels, and again only one class is fit for this duty and that is the high speed light cruiser, the employment of such vessels permitting the main battle fleet to be held at some position on interior lines where it is free from the task of watching, secure in the feeling that its light cruisers will give it a warning in sufficient season to enable it to fulfil its destiny by destroying the enemy fleet thus gaining the mastery of the sea, and being the better able so to do because of this period in which to prepare without the strain of watching and sea keeping.

Such cruisers also are required on our trade routes in large numbers, as we see that privateering, presumably abolished by the Declaration of Paris of 1856, was in effect subtilely revived by the Peace Conference of 1907. The utility of such predatory activities to injure the enemy's commerce and to protect our own is very great. A review of the past eight months of European War proves that the light cruiser of high speed has proved its value on all the seas, as witness the successful German commerce destroying work, and the fine work of the British *Undaunted* and

Arethusa, the former being credited with the sinking of four German destroyers in one morning in a running fight. It is chiefly speed which has enabled the German light cruisers to achieve the amount of success placed to their credit.

Merchant ship reserves, if we had such, might permit us to delay urging the construction of scouts, as they form another element of defence in time of danger, perhaps as effective as any other available to wise and liberal statesmanship, and such means would be at hand *if* we had lines of ocean-going steamers of high speed able to keep the sea for long periods of time. Any of the ships could be converted quickly into a ship of war. A comparatively small force of this kind, appropriately armed and let loose



"KARLSRUHE," FROM A PRIZE, FALL OF 1914

on the ocean under the command of bold and intelligent officers, would be a dangerous foe to the commerce of any country.

Destroyers in no wise make up for our deficiency in scouts, and furthermore they have another and distinctive rôle in battle and cannot be diverted therefrom without grave consequences. In the January, 1915, maneuvers, as mentioned previously, an attempt to use them as scouts failed utterly because, among other limitations, they could make but little over 10 knots in the moderate sea then running. Off Tampico in 1914 it was proven that though they have a large steaming radius their personnel cannot endure the discomfort due to rolling and the hardships of duty in the open sea very long, and that the destroyer with its lack of provision capacity added to the above defects cannot be made to take the place of a scout. Of the unfitness of a destroyer for the duty of a scout the *Outlook* recently has this to say, all of which is

accurate: "In order properly to serve the fleet to which it is attached a scout must be able to keep going in all weathers. Destroyers are not designed with an eye to seaworthiness and consequently in rough weather they are not able to perform their duties as scouts. Three years ago, while attempting to perform scout duty during the fleet maneuvers, several destroyers were nearly lost, and maneuvers were abandoned because of the weather. The same thing has again occurred very recently; and the destroyer scouts were given permission to seek shelter.[1] This statement is a proof that the people of the country are evincing an interest in the type and efficiency of the units of our navy.

Thus the navy to-day finds itself in practically the same condition as in the Spanish War as to its preparedness with scouts for use with the battle fleet. Then we had five, and these failed to locate the squadron of Admiral Cervera. Tactical study proves that his squadron would have been located without fail by even these few scouts could they have been properly utilized, and the result of a successful search would have been the destruction of this squadron before it had reached port and in consequence of this the costly expedition to Santiago would have been unnecessary.

Should we not wake up to our need now and urge the provision of scouts above all other types until we have a real scouting force? The force of ships required to carry out a policy of a country must be well balanced as well as sufficient. Is not, as we consider the problems that will arise, our fleet now greatly deficient in its light cruisers and destroyers even so much so as to impair the probability of successful action of our squadrons of capital ships?

Place any one of us in the command of our main fleet and let us imagine what would become of our attempt to seek the enemy fleet and destroy it. Such groping in the dark would wear us utterly out with nothing gained. Work at strategical games convinces us that to conduct a naval war successfully without scouts will require more luck than brains or foresight. These games usually prove that it would be only due to good fortune if our battle fleet should meet and destroy an over-sea expedition landing on our coast, and that, in our present lack of light cruisers, no amount of good management could change this factor of luck to the factor of skill.

[1] *Outlook*, April 3, 1915.

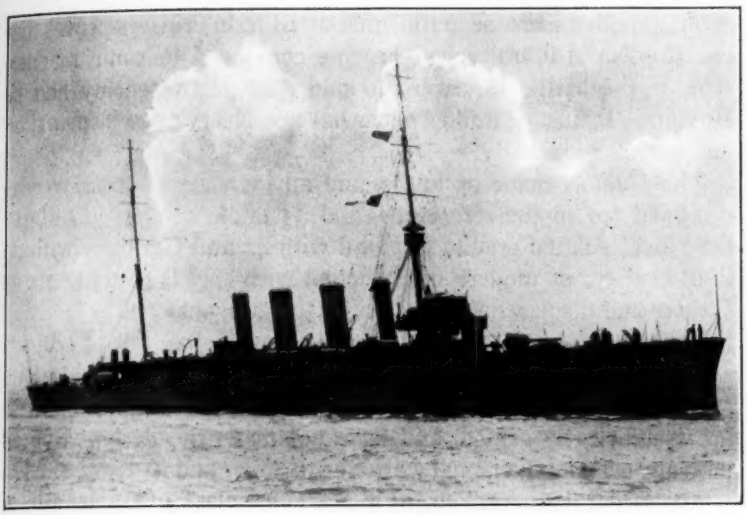
That English naval officers now consider the need of scouts to be axiomatic is illustrated in the statement from the Admiralty (March, 1915) which announces the main features of six new battle-cruisers and adds "they will, of course, all have their proper complement of light cruisers and destroyers." In speaking of the need for these light cruisers an English admiral not long ago stirred the Admiralty to action: "No guns, heavy or light, will protect a battle fleet from torpedo attack at night. The only effective method of protection is to employ a large number of small cruisers to clear a wide area about the battle fleet at sundown." . . . . "The small cruiser force must be disposed so that they form a protecting screen distant 120 to 140 miles on all sides from the battle squadron. By no other means is it possible to move a battle squadron at night without risking its destruction by the attack of torpedo craft."[6]

For making a close approach in the daytime without being seen submarines are efficient, provided the fleet is at anchor or cruising at a low speed and is not protected by a screen of auxiliaries or destroyers. This approach can be made to within 3000 yards in clear weather, but in hazy weather or in a sea that has white caps this is decreased to 1500 yards, and if cruisers and pickets are distracted by a destroyer feint 1000 yards may be possible. To remove this source of danger, the light cruiser becomes a necessity. It is noticeable that the success of the German offensive by means of submarines has not continued, and the assigned reason is that England now having learnt a severe lesson in her losses of big ships keeps her light cruisers guarding her battleships in the manner pointed out by Lord Charles Beresford and thus saves both types from further damage by submarines.

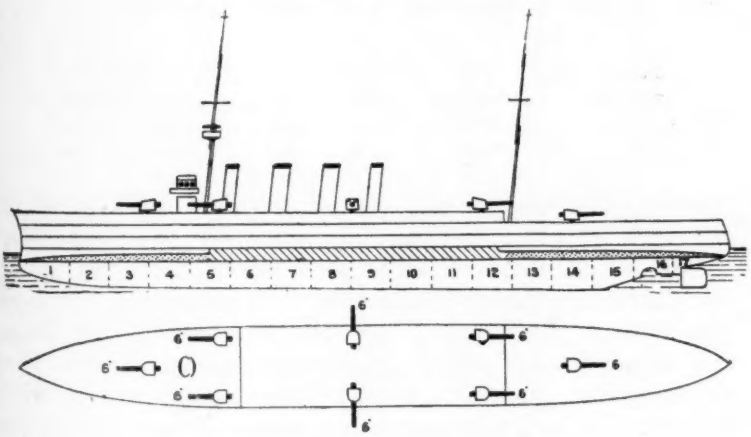
Reasoning from the foregoing I believe we should begin the construction of light cruisers in real numbers at once; as did England in 1912 and 1913, when startled by Admiral Beresford's[7] warning, she laid down eight light cruisers of the *Arethusa* class each year, although she had laid down but three light cruisers in each of the two preceding years. England's light armored cruisers "will be the smallest, cheapest, and fastest vessels, protected by vertical armor, ever projected for the British Navy. They are designed for attendance on the battle fleet, to be its eyes and ears

[6] Admiral Beresford, R. N., in The Betrayal.
[7] The Betrayal.

by day and night, to watch over it in movement and at rest. They will be strong enough and fast enough to cut down any torpedo-boat destroyer afloat." [8]



ENGLISH LIGHT CRUISER "DUBLIN"



PROFILE AND DECK PLAN, "DUBLIN" CLASS

The *Dublin* class, the famous *Sydney* being one, of three large sea-keeping scouts, laid down in 1911-1912, were followed

[8] Mr. Churchill, the First Lord of the Admiralty, in defining the need for such vessels.

in 1913 by three similar scouts, *Nottingham* class, and then immediately after this class in the same year eight light cruisers, *Arethusa* class, were laid down, and these were followed by eight more the next year, *Calliope* class.

This sudden increase in the building of light cruisers proves that the English Admiralty had become convinced in some manner, that, if the battle fleet were to find that of the enemy and be England's mainstay, it must needs have both service of information and service of security.

The *Dublins* made 25 knots, and an increase to 30 knots was designed for in the *Arethusas*, and 35 knots realized. In 1914 the Naval Annual credits England with 41 and Germany with 29 light cruisers of modern construction with speeds of 23 knots or greater and displacements between 3500 and 5400 tons.

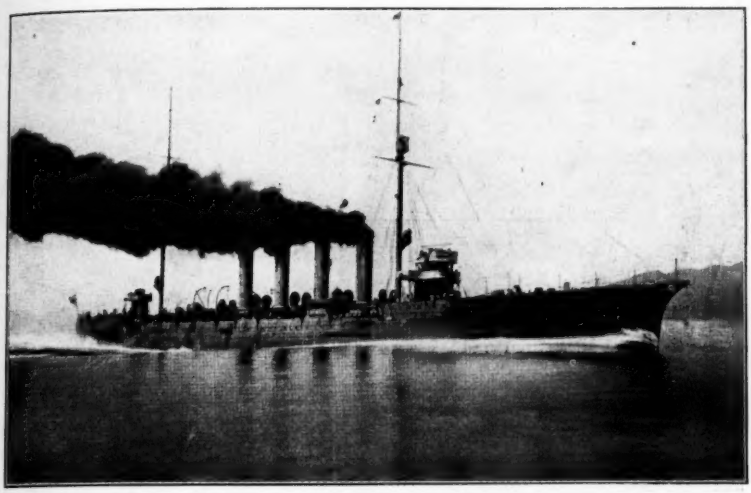
For the outposts of a fleet cruising at sea we require 15 cruisers which will take our present whole cruiser force and leave us no scouts. Properly speaking we have now but three scouts and these are insufficiently armed, and have not made the designed speed with any certainty in actual work due to boiler and turbine troubles.

The general dimensions of the *Dublin* class are a length of vessels for scouting duty now appears to be fairly uniform. Scouts of three nations have characteristics as follows:

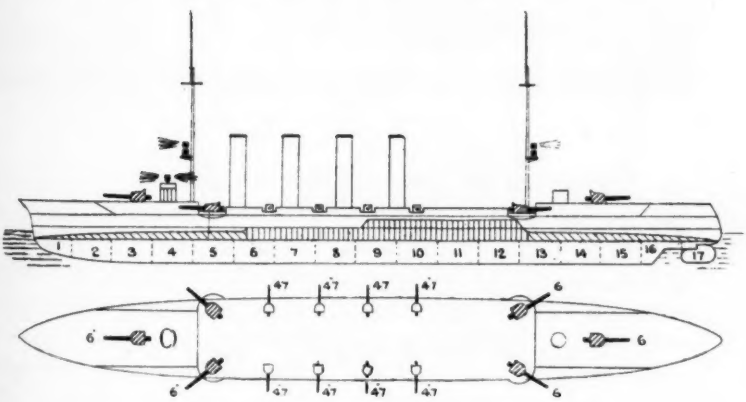
Nation	Class	Displacement	Speed	Armament
Japanese	Hirado	4,800	26	6 6-inch, 3 tubes
German	Breslau	4,500	27.5	12 4-inch, 2 tubes
English	Dublin	5,400	25.5	8 6-inch, 2 tubes

The general dimensions of the *Dublin* class are a length of 430 feet, a beam of 49 feet, mean draft of 15 feet 10 inches, having an armor belt of 3-inch nickel steel, developing 25,000 h. p., carrying a complement of 400 men, with a steaming radius of 4500 miles. The *Hirado* is 465 feet long and 46 feet beam, 16.5 feet mean draft with a conning tower of 4 inches, and a protective deck of 3 to 2 inches. She has lofty masts with specially designed crow's-nests to permit the greatest efficiency in sighting vessels at a distance. The German scouts of the *Breslau* class are 446 feet long, 44 feet beam, 16¾ feet draft with a 2-inch armored deck and 2½- to 4-inch side armor, and made 26.9 to 27.2 knots as their mean speeds for their six-hour full power speed trials, developing from 25,136 to 28,872 s. h. p. The German protected

cruiser *Strassburg* of this *Breslau* class is credited on her official trials as having made the best speed of the four sister ships, that of 28.28 knots per hour, and I do know that in actual service



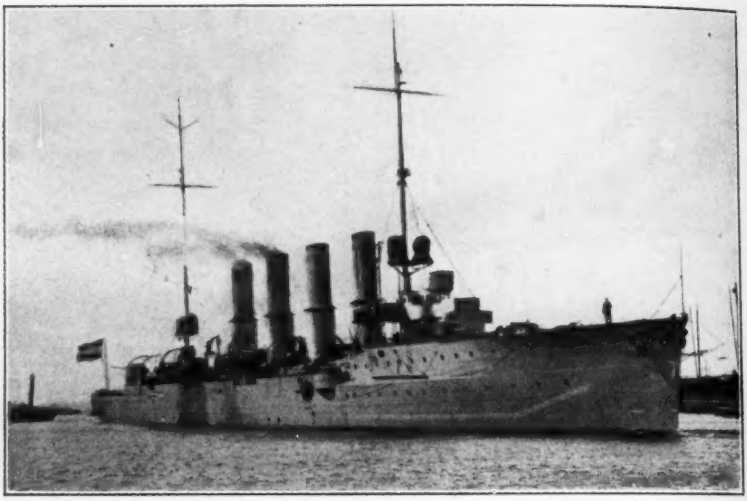
JAPANESE LIGHT CRUISER "HIRADO"



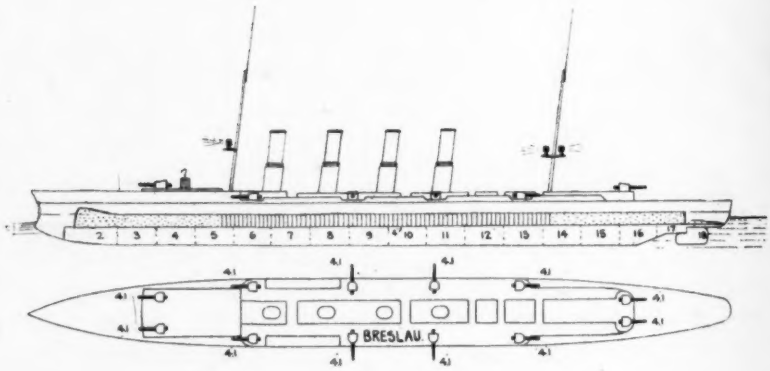
PROFILE AND DECK PLAN, "HIRADO"

recently she has made several long runs that averaged over 29 knots per hour, making 30 knots for part of the time. The speed of the *Karlsruhe* was stated to me by her commanding officer to be over 30 knots.

A noticeable fact in connection with the building up of the German light cruisers is, that in the *Ersatz Hela* class of four, laid down late in the fall of 1914, the armament of twelve 4.1-inch guns



GERMAN LIGHT CRUISER "BRESLAU"

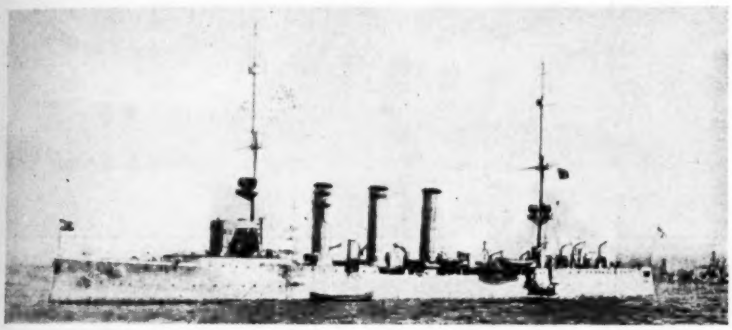


ELEVATION AND DECK PLAN, "BRESLAU"

was abandoned in favor of ten 6-inch guns, which shows that they now consider the 4-inch caliber too light. This one caliber armament is preferable to the armament of the English *Arethusa* class, for the good and sufficient reasons that have been thrashed

out so often in our service publications. The *Sydney's* victory over the *Emden* is due to one fact and one only, and that one is that she possessed 6-inch guns that outranged the Emden's 4-inch guns.

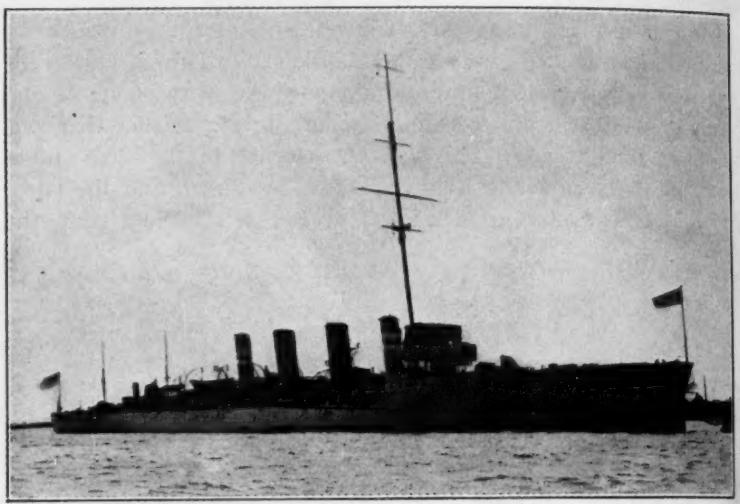
The development of the present type of swift light cruisers in the English service commenced in 1903 with the *Sentinel,* having a displacement of 2895 tons, which displacement gradually increased, and, in 1910, we see the *Active* class of three vessels, of 3440 tons displacement, and of 26 knots speed, with no armor and only guns of 4 inches in caliber, being slightly smaller than our *Chesters* built in 1907. This class was recently brought more up to date by the remodeling of their batteries, substituting the latest type of 4-inch guns for her low powered guns. Next come the



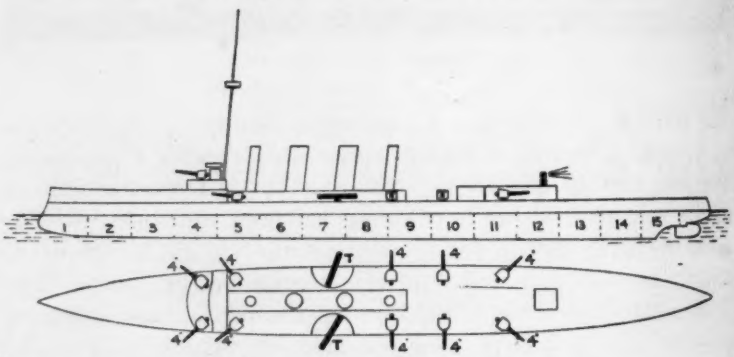
THE "EMDEN" AND "DRESDEN"

five *Bristols* of 4800 tons displacement, having two 6-inch guns in their battery with 26.8 knots speed; then the five *Weymouths.* We now find the displacement has risen to 5250 tons and that an armor belt of $2\frac{3}{4}$ inches in thickness has been added that extends from the upper deck to well below the water-line and for the whole length of the ship. The battery becomes eight 6-inch. The *Dublin* class in 1911 of three ships has the displacement increased to 5400 tons, the battery being the same, but a double skin plating on the water-line is similar to the protection of our *Chester* class. The three 1912 light cruisers, *Nottinghams,* are of the same tonnage but with 2 inches of side armor in addition to the protective deck, and carry nine 6-inch guns, an addition of one. This class have tripod foremasts for stability of fire control and vision. They burn both coal and oil, and the speed is still held at 25 knots. Here

the increase in tonnage of the light cruisers stops and we find a return to a tonnage of but slightly more than the *Active* in the *Arethusa* class of eight vessels of the 1912 program; then we note the eight of the 1913 program, *Calliope* class, again increasing in displacement, their displacement being put at 3800 tons. The



ENGLISH LIGHT CRUISER "ACTIVE"



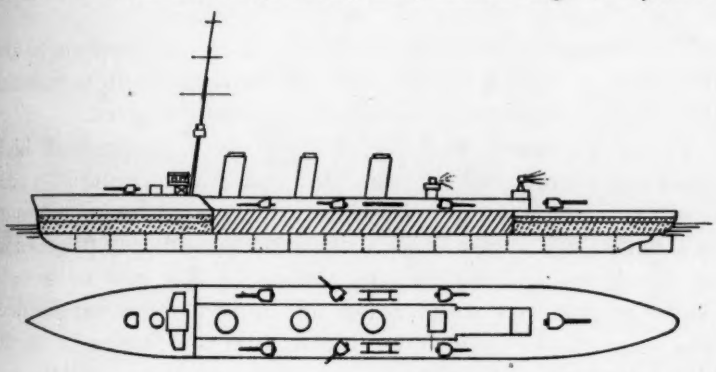
PROFILE AND DECK PLAN, "ACTIVE"

armament goes to but two and three 6-inch guns respectively, and six 4-inch guns, while the armor belt amidships is 2½ inches. A noticeable feature of these vessels is the fact that they burn oil only and are designed for 30 knots and 35 knots was speed hoped for.

France is now building three light cruisers of 4429 tons in displacement, to steam at 30 knots, to burn oil only, and to carry a battery of eight 4.6-inch guns with a protection of a belt 1.6-inch. These are to be called flotilla leaders.

Russia is building the *Admiral Nakhimov* class having the large displacement of 7500 tons, armed with sixteen 6-inch guns, with armor belt of 3 inches. The after part of these vessels is to be especially constructed so as to launch seaplanes. They will also carry 100 blockade mines.

England's naval construction is, of course, better known to us than is that of other countries, and, considering the cycle of



PROFILE AND PLAN, "ARETHUSA" AND "UNDAUNTED" CLASS, 8 SHIPS

changes in that country together with the trend of construction in Japan and Germany, so far as we know it, the type of scout the writer recommends for our construction is a vessel of the protected light cruiser class with general characteristics as follows:

THE BEST TYPE OF LIGHT CRUISER

Displacement	5200 tons.
Speed	28 knots.
Length	430 to 460 feet.
Beam	48 feet.
Draft	Maximum not over 19, and mean about 16.5.
Armor	A partial side belt of maximum thickness of 3 inches, a conning tower and armored tube of same thickness; protective deck over machinery and boilers.

Fuel to be oil and sufficient for a steaming radius of 5000 miles at 15 knots.

21-inch submerged torpedo-tubes, mines and gear for quickly planting them, one 3-inch field gun, two automatic guns.

One hydroaeroplane or more properly speaking, seaplane with catapult launching device and proper hoisting apparatus is to be carried.

Lofty pole masts well stayed, fitted with crow's nests, protected from the weather for the lookout and fire-control stations and for the aerial of a powerful radio sending apparatus.

The provision and water capacity, bake shops, and refrigerating plant must be sufficient for three months at least.

The reasons for adopting the characteristics outlined above are now given in a brief manner, but sufficiently at length to indicate the principal arguments for the type of cruiser selected.

The displacement should be great enough to attain both high speed and a large cruising radius, to permit the carrying of a seaplane, to accommodate large supplies of provisions and yet it must be small enough to permit the scout to perform during peace most of the duties now assigned to gunboats. The cost of a light cruiser must be kept within reasonable limits and this requirement also keeps displacement low. Hence 5000 tons seems to be the higher limit.

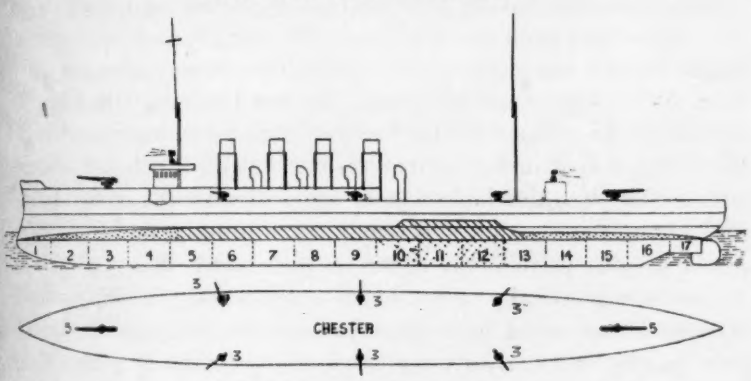
The speed of 28 knots is great enough to catch destroyers in any but the *smoothest* seas, and is considered as high as is within the limits of practicability while retaining moderate dimensions and cost. In building the boiler plant let us not repeat the mistake made in the types of small tube boilers adopted in our present three scouts and which types have proven failures; but adopt boilers of known merit, such as the Yarrow, the Miyabara, Schultz, Thorneycroft, White Forster, and many others. Our engineering plant must contain only turbines, pumps, and auxiliaries of proven efficiency.

The draft should be kept as low as practicable and, having a maximum of 19 feet, the cruiser will be able to enter most of the ports where our gunboats can, such as for instance the Panuco River in Mexico. As a matter of fact we have very few really light draft gunboats, and even the *Nashville* has great difficulty in crossing the bar at Santo Domingo, a feat which the *Dolphin*, with

her 17 feet draft, cannot accomplish any more than could a modern scout. *A light cruiser of this type will do the gunboat duty as well, if not better, than the gunboats do it, and this fact is worthy of emphasis.*

The unrest in Mexico during the year 1914 proved that scout cruisers do take the place of gunboats very well, and in addition that they have a real military value to the nation possessing them

OUR LIGHT CRUISER "CHESTER"



PROFILE AND DECK PLAN

in time of war. As examples, are cited the *Bristol,* the *Dresden,* the *Karlsruhe,* the *Chester,* all of which did gunboat duty, even ascending the Panuco River. The ability of the *Chester* to carry a large marine guard was of immense military value, and this feature is most important in most of our peace duties for gunboats and cruisers in the many countries we deal with that have unstable

governments. Save then for duty in the Ozama River at Santo Domingo City for which duty only few gunboats, *Nashville* and *Helena* class, are suitable, others being of prohibitive great draft, we do not require light draft gunboats, and have sufficient now. Thus, in considering the building of scouts, we bear in mind their availability for many of the multitudinous duties of our navy in time of peace, and their general superiority over gunboats in that duty, the cost of maintenance being very little greater, and add the war valuation of the scout.

The question of armor protection is one on which many will differ, yet the reasons for the amount of protection recommended for light cruisers are considered to be sufficient, and this protection must be placed on a vessel of this type. While willing in the case of battleships to subscribe to the words of the late Rear Admiral Cradock as he writes an epitaph for armor in these words: "Armor seldom gives any trouble; even the plates themselves know they are on their last legs, and another decade will see them in the museum, alongside hauberk, helm, and visor, dusted twice weekly";[8] I am not prepared to do so in the case of light cruisers. Considering the English recent light cruisers we find that the *Nottingham* class has an outer plating in its belt of nickel steel, the whole three inches in thickness. Having decided upon three inches for our new type let us consider the reasons why we consider that necessary and adequate. The scout cannot fight a battle cruiser, so we will not protect against such a contingency, but it has a fast enemy in the destroyers, the best of which are armed with 4 inch 50-caliber high velocity guns. Under the most favorable circumstances this gun's maximum penetration of Krupp armor at 4000 yards is 3.2 inches, at 3000 yards it is 3.9 inches. So we have practically protected the engines and the ship control stations of our scout from destroyer gun-fire. Again, the scout may do duty in a narrow river where it is exposed to 3-inch field guns at almost point blank range—as in the Panuco—and we find that at 300 yards a 3-inch field piece can penetrate but 1.6 inches of Krupp armor, a 3 inch 50-caliber gun at the same range just getting through 2.96 inches of similar armor. Thus the choice of three inches as a belt protecting the engines and boilers seems justified for our light cruiser.

[8] Sir Christopher Cradock, R. N., in Whispers from the Fleet.

The 6-inch gun is chosen for the one caliber battery of the ship, as that caliber gives the cruiser an immense superiority over its enemy, the destroyers, and gives it a weapon capable of fighting the best vessels of its own class built or projected in other countries. The torpedoes and mines are necessary for both the offence and defence.

Before leaving the question of armor and armament the need for having gun shields on all gun mounts of a vessel of this class is considered sufficient to warrant them being placed there. At least they will protect the crew against rifle and machine gun-fire in times of insurrection when on the duty of protecting American interests abroad, and they may even deflect the 3-inch shells of destroyers under certain conditions of impact. The moral effect is certainly great and is worth some sacrifices in weight to attain. Gun positions open to rifle fire are not conducive in stimulating that confidence and repose a pointer must possess before he can shoot accurately.

The increase in value of the vessel as a scout by having it carry a seaplane is so great as to make it essential that a modern scout be equipped with one. The value of a seaplane is only nullified by fogs or strong winds and therefore it is more often efficient than not. Lieutenant Saufley [10] states as a result of his figures that a fleet even though it be without screen or scouts can, in clear weather, by sending up seaplanes, search out such an area that, if no destroyers are visible therein, the fleet is secure from attack until 11 in the evening. By sending these seaplanes up from a scouting line an area can be searched out and the seaplanes be back at dusk such that the battle fleet can relax and be secure from attack the entire night. What a needed respite from anxiety will accrue to a fleet thus protected!

Such a vessel will cost exclusive of armor and armament about $3,000,000, and this is under the cost of the *St. Louis* class, which cost was $3,818,190, while it gives us a vessel much superior in every way.

Emphasis has been laid in the foregoing pages on the utility of scout cruisers for the peace as well as the war duties of the navy and upon the fact that they can do gunboat service better than the gunboats on account of their speed, steaming radius, provision

[10] PROCEEDINGS No. 153, p. 1463.

capacity, large crew and a landing force of efficient marines so necessary in times of insurrection. A light cruiser can act alone for considerable periods of time, while a gunboat, independent for but two weeks at the most, must depend for its supplies on larger vessels being near, requiring a battleship as a mother vessel, with the result that two such vessels are required for the duty one light cruiser would do as well.

In concluding this article the writer expresses the hope that our navy will soon possess its light cruisers and thus will be rounded out into the moderate-size well-balanced navy that our country requires in order to protect our citizens from any interference with their territory, their rights, and their privileges, and to preserve and protect their lives and their property wherever they may be situated.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

A FASCINATING STUDY

By LIEUT. COMMANDER LYMAN A. COTTEN, U. S. Navy

Motto: **The fundamentals of genius are industry and study.**

That there is no royal road to learning needs no demonstration to naval officers generally, but that the study of certain professional subjects may properly be termed fascinating will not so readily be admitted.

In China a native coolie happened to stop for a well-earned rest in sight of a tennis game played by " foreign devils." He watched them in amazement for a few moments as they rushed back and forth across the court, and remarked to his companion, " It seems strange that people of their *apparent* station in life cannot hire coolies to do that for them." So much depends on the point of view. A day-laborer, surfeited with physical exertion, cannot reasonably be expected to see the fascination of tennis or golf, but that does not affect the fascination for those who are not in his physical condition.

When one graduates from the Naval Academy he may be said to be surfeited with study, and it is but natural that he should glory in pastures new with little thought that the words " fascinating " and " study " may be even remotely associated. However, if he persists in this attitude, he not only limits his future professional development, but also deprives himself of the means of filling many an hour of his naval life with pleasure and profit.

The requirements of a general education for a line officer, combined with certain elementary professional subjects, as ordnance, steam engineering, navigation, etc., so congest the years at the Naval Academy that necessarily other more remote, but none the less important, subjects are left to the future. Some of these subjects are not only not taught at the Naval Academy, but they are even so slightly touched upon that both their importance and their fascination are often undetected until perhaps later, when

some fortuitous circumstance or natural bent may lead to an all too tardy realization of both.

The Naval War College in large part makes up the above-mentioned deficiency of the Naval Academy. It takes officers at a later stage of their development and reawakens the enthusiasm of youth as it reveals the fascinating fields of its activities. It is not intended here to even enumerate the many virtues of the War College, but it is desired to point out that one of the most important of its functions is the opening up to one's vision of a large and fascinating field of profession study that can be pursued *privately* and *individually* after one has gone from its halls. What may be learned at the War College, be it much or little, cannot exceed in value the intelligent revelation of the vast and widely diversified field of *future* study involved in the subject of the science of war.

However much the War College may assist with its facilities and its methods, after all individual advancement must come through individual effort, long-continued and constant through years of "general service," rather than sporadic, as it must be if confined to the occasional few months at the War College. There is no authoritative and comprehensive treatise from which one may master the science of war as he may logarithms, or navigation, for war is a conflict of minds as well as of men and material. It must be gathered a bit here, as one reads history, and a bit there, as a campaign is studied. It must above all things be construed in the light of present-day conditions and things, and the individual must furnish his own reasoning process and draw his own deductions, though, of course, the deductions of other students in the same field may greatly aid him.

The War College has certain very useful methods, that facilitate the study of both the science and the art of war, but none of them are offered as a substitute for thinking. They are merely aids to methodical thought by which ideas and decisions are translated into action, and thus mental training be obtained for correctly gauging similar action in actual service.

The strategic game or chart maneuver is more or less familiar to us all. It is a method of testing strategy and an aid to correct thought and ideas on the subject. Unfortunately it requires for its operation room, paraphernalia and time, which unsuits it to a certain degree for use in the general service. The first step in the strategic game, and a most important one, is the estimate of the situation. The object of this paper is to indicate a logical

and systematic method of estimating situations of the broadest extent; not situations limited by the terms of theoretical problems, as useful as the study of such situations may be, but world situations as they exist to-day. It may be called the study of naval frontiers.

The study of naval frontiers has for its object the correct determination of campaign areas in possible future wars; areas in which attack is most probable, and those from which defence may best be conducted; areas where success of arms will be rewarded by the greatest political effect tending to terminate the war, and areas in which military weakness carries a national menace. All of this cannot be expected from the energies of one or even a small number, and the further object of this paper lies in the hope that others may find in the subject such fascination that from the combined talents of all a sound school of service strategic thought may be ultimately evolved.

As the estimate precedes the chart maneuver so the chart maneuver should be but preliminary to grand maneuvers on the sea, but all of these are valuable in direct proportion to the amount of antecedent study.

Nothing herein lays claim to being either authoritative or comprehensive. It covers but one small subdivision of the many ramifications of the science of war, but an important one. Strategy itself cannot command victory, but it may indicate where the application of military energy will be rewarded by the greatest national gain.

In anticipation it may be stated that the study of naval frontiers does not require bulky or numerous appliances or space beyond one's cabin desk, and it may be pursued alike in the odd moments between ship duties and in hours unbroken by routine interruptions.

The naval frontier of a nation may be defined, at least for the purposes of study, as the limits of its military power on the sea. It includes all the territory facing the sea, whether contiguous or remote, that is under the political control of a nation, and such parts of the seas themselves as are occupied or controlled by its fleets, or are necessary to the military security of its territory. Thus our eastern naval frontier, starting near the easternmost point of Maine sweeps down outside the coast to the Straits of Florida when it juts out to the eastward around Porto Rico, then back around Jamaica and south to Panama. (What a reces-

sion the "Key of the Caribbean" makes!) Of course, this "frontier" includes territory not under the political control of the United States, but its relations to the United States are such as to place it in a special category in a naval sense. Without in any way anticipating or desiring political control of any territory between Texas and the Panama Canal, this territory rightly falls within our naval frontier as herein defined for purposes of study.

Where a country has a frontier conterminous with that of another country its military importance is determined by the relations between the two countries, their relative military strength, and the strategical importance of the area adjacent to the frontier. A nation's naval frontier may be said to be conterminous with the naval frontiers of all other nations touching that sea, for only the high seas intervene and these are free to all that can maintain their right thereto. The extreme mobility of naval power makes the seas a convenience rather than a barrier, for its mobility is one of the most valuable assets of naval power. Extreme distance, it is true, lessens the convenience, but, so long as the difficulties of distance on the sea may be overcome, it is unwise to consider this sea area a barrier of defence. In consequence the military importance of a nation's naval frontier is determined, not in relation to one other nation, but to all nations having adjacent sea frontiers.

As an illustration of what is meant, we may take the case of our own country. Her land frontier to the north is exposed only to Canada, and to the south only to Mexico, and the military importance of these frontiers must be determined in relation to these two countries only, but her naval frontiers are exposed not only to *both* of these countries but also to *all* other countries having access to the Atlantic and Pacific.

However important to a country in a military sense may be a common land frontier, its naval frontier cannot be less important, unless its land neighbor and *all other possible enemies* are devoid of sea power, for the frontier is exposed to all. If through a fancied greater importance of her land frontier a nation strengthens it beyond the strength of her sea frontier, then, in case of war, she may expect the latter to receive the attack, for it is obviously good strategy for her opponent to deliver her attack at the weakest point at which success will produce the desired result, and in addition other possible enemies can reach her through her

naval frontier *only*. The defence of a land frontier is against a particular enemy, of a naval frontier against all possible enemies.

War becomes war in fact, only when one belligerent penetrates the naval or military frontier of another, or attempts such penetration, for only then do military forces on sea or land actually clash. An army or a navy extends the military or naval frontier of its country when it advances and contracts it when it retires. Therefore the area of hostilities may be defined as the area of *overlapping* military or naval frontiers. For these frontiers to overlap one or both belligerents must act on the offensive, because the offensive is nothing more than the attempt to extend one's military or naval frontier.

Thus it follows that before a course of action in war can be determined the *area* in which it is desired to extend the frontier has to be decided upon, and then the *point* or *points* of attack in this area are determined. It is as an aid to the proper determination of these areas and points of attack that the study of naval frontiers has its usefulness. In other words, it is merely an aid in selecting the military objective in war, for one's self, that his efforts may be accomplished with the least possible loss in time and men, and for one's enemy, that his plans may be frustrated.

The general objective in a war may be, and generally is, determined by the political objective of the war, but even when this is so the means of so extending the frontier as to accomplish the desired result is purely a military function. The very cause of a war may be disagreement as to the limits of military frontiers, as where territory or territorial rights are claimed by two nations. This was the case in the Russo-Japanese War. In such a case the *area* of hostilities is largely determined by the subject matter of the disagreement, but none the less the immediate military objective, the attainment of which will the most easily and surely accomplish the political objective of the war, has necessarily to be determined from military knowledge and reasoning. Where military success can be attained the easiest and where success will produce the greatest effect are the two main points upon which the study of naval frontiers may throw light as regards offensive action, while defensively such study may indicate the most probable point at which an enemy's attack will be delivered, thus facilitating the defeat of his plans.

Since it takes two combatants to make war it follows that in studying naval frontiers those of two countries should be taken

and studied in relation to one another. Any two that confront one another will serve the purposes of study, but for obvious reasons it is generally more interesting and more pertinently instructive to take one's own country and study its naval frontier in relation to those of other countries in turn. One's own country being of paramount importance, and knowledge and information regarding it being available in amount and detail more than of other countries, study of it can be and should be as thorough as possible, which indeed applies to others in so far as information is available, and it may be said in passing that much information of interest and value slumbering in the seclusion of secret archives but awaits the demand to come forth and shed its light where light is needed.

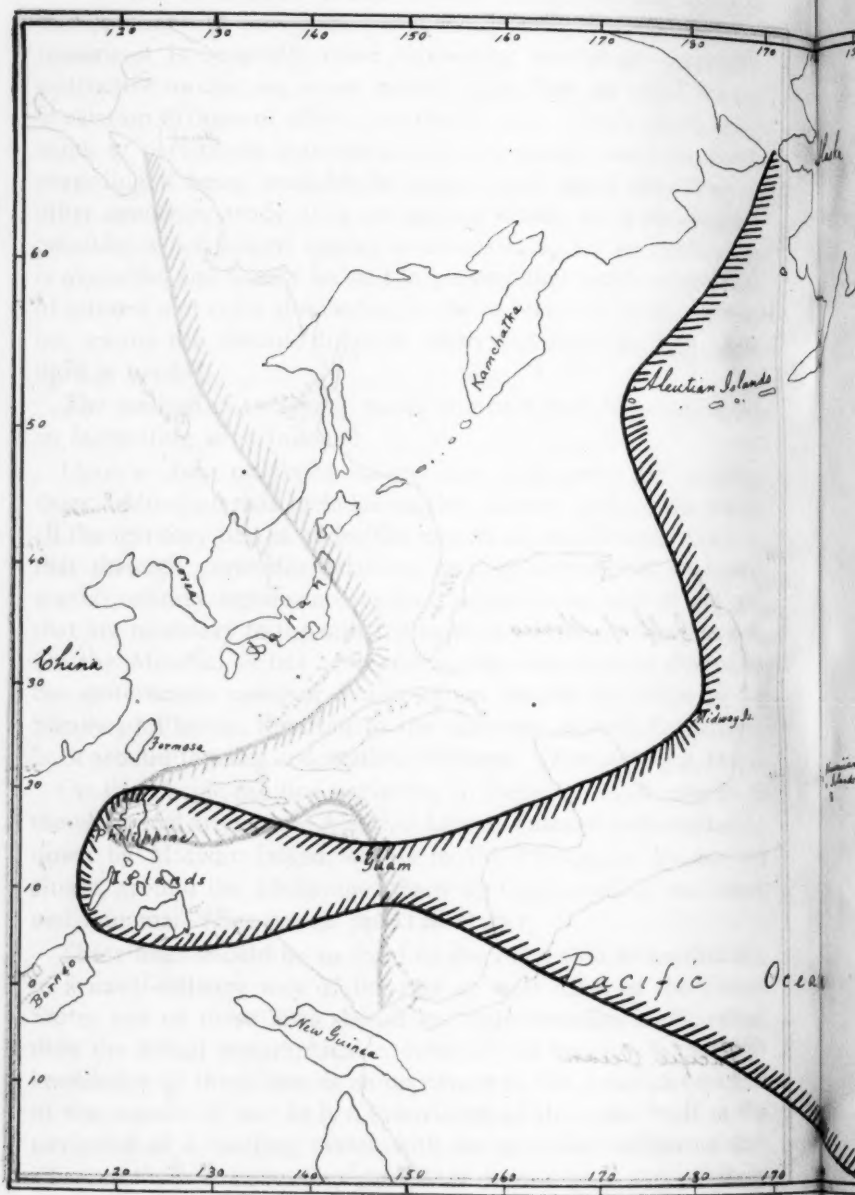
The method of studying naval frontiers that has been found so fascinating is as follows:

Upon a chart or sketch of any size convenient for handling, draw a blue line that includes on the Atlantic and on the Pacific all the territory that is under the control of the United States, all that through particular relations may be considered as having special military significance to the United States and all the seas that are necessary to the military security of this territory in war. On the Atlantic, as has been stated, this line extends from near the easternmost point of Maine down outside the coast to the Straits of Florida, then out to the eastward around Porto Rico, back around Jamaica and south to Panama. (See sketch, p. 1127.)

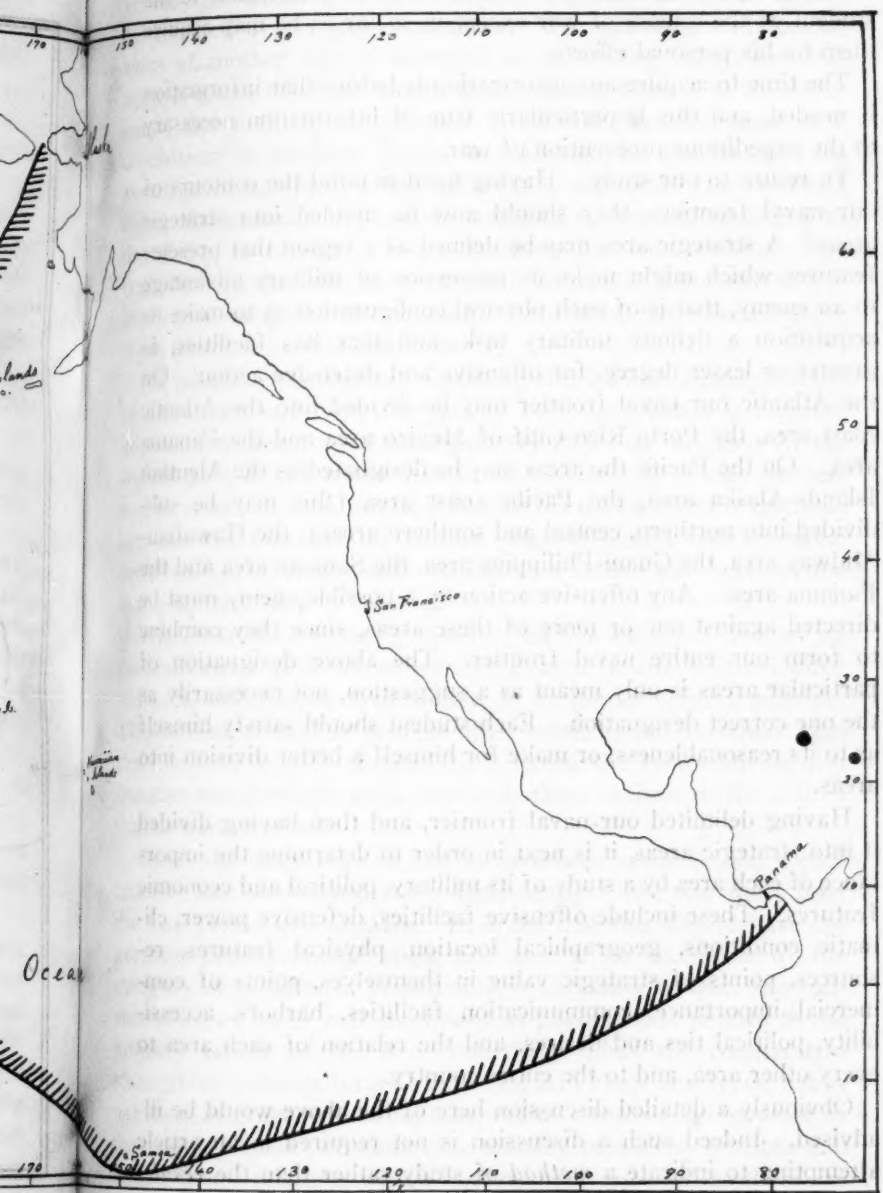
On the Pacific the line beginning in Behring Strait extends to the westward around the Aleutian Islands (almost to Kamchatka) down by Midway Island, across to the Philippines by way of Guam, around the Philippines, back by Guam and on to Samoa and Panama. (See sketch, pp. 1128-1129.)

These lines should be so fixed in the mind that when thinking in a naval-military way of the east or west coast of the United States one of these lines should instantly visualize itself, rather than the actual geographical contour of the coast. A thorough knowledge of these lines is as important to the American student of the science of war as is a knowledge of the coast itself to the navigator of a coasting vessel, with the enormous difference that whereas the navigator may go ashore in any port and purchase good charts and sailing directions, and millions are spent as aids to his safety and in getting the latest information into his hands,

American Naval Frontier on the Atlantic



AMERICAN NAVAL



N NAVAL POWER ON THE PACIFIC

such corresponding information and aids are not available to the student of the science of war except in so far as he may acquire them by his personal efforts.

The time to acquire any information is before that information is needed, and this is particularly true of information necessary to the expeditious prosecution of war.

To return to our study. Having fixed in mind the contours of our naval frontiers, they should now be divided into strategic areas. A strategic area may be defined as a region that presents features which might make its possession of military advantage to an enemy, that is of such physical configuration as to make its acquisition a definite military task, and that has facilities, in greater or lesser degree, for offensive and defensive action. On the Atlantic our naval frontier may be divided into the Atlantic coast area, the Porto Rico-Gulf of Mexico area and the Panama area. On the Pacific the areas may be designated as the Aleutian Islands-Alaska area, the Pacific coast area (this may be subdivided into northern, central and southern areas), the Hawaiian-Midway area, the Guam-Philippine area, the Samoan area and the Panama area. Any offensive action by a possible enemy must be directed against one or more of these areas, since they combine to form our entire naval frontier. The above designation of particular areas is only meant as a suggestion, not necessarily as the one correct designation. Each student should satisfy himself as to its reasonableness, or make for himself a better division into areas.

Having delimited our naval frontier, and then having divided it into strategic areas, it is next in order to determine the importance of each area by a study of its military, political and economic features. These include offensive facilities, defensive power, climatic conditions, geographical location, physical features, resources, points of strategic value in themselves, points of commercial importance, communication facilities, harbors, accessibility, political ties and desires, and the relation of each area to every other area, and to the entire country.

Obviously a detailed discussion here of the above would be ill-advised. Indeed such a discussion is not required in an article attempting to indicate a ***method*** of study rather than the ***results*** of study. Even could one speak with the voice of authority, to which no claim is here made, the value of study to others would not thereby be lessened, for methodical study itself creates a mind-

process for which even authoritative dogmatic assertion cannot be accepted as a worthy substitute. The premises and conclusions of another may be accepted as facilitating study, for it is always easier to detect faults in a creation than it is to create anew, but nothing so incapable of actual demonstration as a conclusion in strategy should be accepted on the *ex-cathedra* assertion of another. After all what is desired of the rank and file is not so much the correct solutions of present problems as the ability to correctly diagnose future problems as they arise from time to time and in the stress of war, and the none-the-less important faculty of anticipating, interpreting and executing the plans of those in supreme authority.

All possible information regarding the various strategic areas of one's own naval frontier having been assimilated, it becomes necessary to select some other country to act as the party of the second part in our study. In order that the study may possess real interest it is necessary to select such a nation that the relations between the two naval frontiers presents a real military-naval problem, even though such a thing as a future war between the two countries may be remote.

The other country being selected, outline its naval frontier on the same chart or sketch on which the naval frontier of the United States is outlined, and, of course, in its proper relative position. This outline should be in some other color, as red or yellow, that the eye may readily distinguish between the two. Divide this frontier into strategic areas and study them as those of the United States were studied.

So far the study may be said to have been academic, since each frontier has been considered independently. The real study is of the two *versus one another*. In order that this should have the greatest practical application, and that it be taken out of the category of theoretical problems, it is necessary to take into consideration as many real conditions as possible that pertain to the military power of the two countries. Thus the comparative strength of military forces subdivided into kinds and types, habitual state of preparedness for war, military traits and character of the people of the two countries, military resources, finances and international relations with all other countries. All of these are important, and none should be disregarded in estimating a general situation. The last is of paramount importance for a nation's military activities and limitations may be absolutely dominated,

not by its actual power, but by its relations with another country. Instances of such a character will occur to anyone after a moment's thought and it is unnecessary to cite them.

In this connection probable causes of war between the two countries under study must be kept in mind, for, as has been pointed out, the cause of war frequently determines the area of hostilities to a large degree by so outlining the political objective that the determination of the military objective becomes fairly easy.

The two naval frontiers having been placed opposite one another, subdivided into strategic areas, and studied, it next becomes necessary to determine the logical and probable main point of departure of military expedition for each country against the other. Thus on our Atlantic coast such a point might be New York, Hampton Roads or some gulf port, depending upon circumstances and the location of the other country. From the previous study such a point should be easily determined.

Lay off on the chart in use the distances from these origins of military expedition to the various strategic areas into which the two naval frontiers are divided, and also lay off the distances separating the opposing naval frontiers at the point or points at which they approach the nearest to one another. The distances must be read in terms of time and ease or difficulty for military expeditions to reach a hostile area for offensive action, or another friendly area for its defence.

Now take each area in turn and, from the information at hand regarding it, and its location in respect to the origins of hostile and friendly military expeditions, estimate the ease or difficulty of occupation by the enemy, the military effect of such occupation, the political effect on each belligerent considering the war as a whole and having in mind the probable political objective of the war, the effect of such occupation on future military operations, the effect on the military fortunes of each belligerent of a failure in the attempt at occupation, and the effect, if any, that such an occupation might have upon neutral nations. From these various considerations must be determined the national military standing of each area, its importance in a particular war and the amount of military attention that it should receive both in war and in peace.

The determination of the above may come through mental familiarity with the subject, based on study and conviction, but,

at least in the beginning, it seems better to set forth in tabular form the considerations and conclusions upon which the determination rests. In this way a record of reasons and results may be preserved and essential considerations are not so likely to be overlooked.

Purely as an illustration, let us assume that the frontiers of the United States and X are under study, and let us further assume that the possible cause of war is some question relating to the Panama Canal, which would carry with it the presumption that the Caribbean-Panama region would be the probable area of first hostilities.

The sequence of steps in our study would be as follows:

1. Outline on a chart the naval frontiers of the two countries.
2. Divide these frontiers into strategic areas.
3. Study the features of each area.
4. Determine logical points of origin of military expeditions, and lay off distances as explained.
5. Determine and record comparative national features of military significance:

United States		X
.....	A. Navy	.....
.....	Dreadnoughts	.....
.....	Pre-dreadnoughts	.....
.....	Battle-cruisers	.....
.....	Armored cruisers.....	.....
.....	Smaller cruisers.....	.....
.....	Destroyers	.....
.....	Submarines	.....
.....	Air craft.....	.....
.....	B. Army	.....
.....	C. Reserves	.....
.....	Navy	.....
.....	Army	.....
.....	D. Oversea transport.....	.....
.....	E. Finance	.....
.....	F. Resources	.....
.....	G. Preparedness	.....
.....	H. Military characteristics.....	.....
.....	I. International relations liable to affect the scope or duration of the war, or the field of operations, and those that may lead to complications with other nations.....	.....

6. For each strategic area in turn determine and record:

A. Defensive power.....
B. Offensive facilities.....
C. Relative geographical location.....
D. Climatic conditions.....
E. Physical features .....
F. Resources .....
G. Points of strategical importance.....
H. Points of commercial importance.....
I. Economic value.....
J. Communication facilities.....
K. Harbors .....
L. Accessibility as regards other areas.....
M. Political ties and desires.....
N. Relations to other areas of both nations.....

and from the foregoing appraise the

O. Ease or difficulty of occupation.....
P. Military effect of occupation on each belligerent .....
Q. Political effect of occupation.....
R. Effect of occupation on neutral powers.....
S. General effect as tending to terminate the war .....

Finally for each area

T. Make an estimate of its strategic importance in a war between the United States and state X, based upon the conclusions O to S.....

As we proceed with our estimates of individual strategic areas it will readily become apparent that these areas have widely differing degrees of strategic importance. If it were possible to assign definite weights to the various factors that go to make up the strategic value of an area, and then to determine with exactness the relative degree in which each area possessed these factors, it would become a simple matter to ascertain the relative strategic importance of each area. However, the subject is far too complex and intangible for such treatment, and instead of exact determination we can only substitute intelligent and methodical estimate. It may be asserted, however, without fear of successful contradiction that methodical estimate is as far superior to untrained inspiration as mathematical determination would be to methodical estimate, were the subject capable of scientifically exact treatment.

From our estimates we will see that one area shows importance in one feature, another in a different one, but one or more areas will show such a combination of significant features that it or they will stand out as of paramount importance. In such areas the enemy under consideration is most likely to attempt to extend his frontier, either because by so doing he can most effectually overcome his opponent, or because of the offensive value of the areas that he wishes to possess or nullify.

The more important areas being recognized as such, no attempt need be made to determine which is the *most* important, unless one so stands out of itself. Where several are of such importance that special effort is required to discriminate between them it is well for the purpose of study to consider each *in turn* as of paramount importance, and to proceed on that assumption.

Subject the area of marked importance under consideration to as detailed study regarding its military features as is possible. Determine its points of strategic importance with their relation to the whole area or to important parts; seek to ascertain the weakness as well as the strength of the area; determine where in the area hostile attack is most likely to succeed and where offensive measures will be facilitated the most; and finally in view of all the study, both general and specific, determine what course of action for the assumed enemy seems to afford the greatest chances of success, and in what manner that course may best be circumvented. Do this for each area of great importance of both countries, and *from the standpoint of each country in turn.* Then by a process of elimination determine what course of military action at the beginning of war seems to offer the most certain winning of such success as will most readily and surely accomplish the political objective of the war.

It is safe to assume that an enemy will take that course of action in war which gives him the greatest chance of success. If he does not, all the worse for him, provided his opponent has foreseen the possibility of such a contingency and is fully prepared to take every advantage of his strategic errors. By the method outlined above we determine what may be termed the most probable course of action, based on such information as is available and upon estimates thought to be founded upon the best reasoning. Our information may be inaccurate or inadequate, and our reasoning radically different from that of our enemy, and in any case

it is unwise to minimize the uncertainties of war, since war is so largely a contest of minds. All of this points to the desirability of further extending our study to include the possibility of our enemy proceeding against any one of our areas, or even several of them simultaneously. Thus we can determine in each case the course of action for us that will make our enemy's errors in strategy redound the greatest to our advantage.

The study of naval frontiers may be applied to past wars, and certain general laws of strategy deduced therefrom that may aid in making correct estimates for possible future wars, but in so doing great care must be taken that the results of strategy are not confused with the results of other factors. To insure this, careful and comprehensive study and trained mental discernment are necessary.

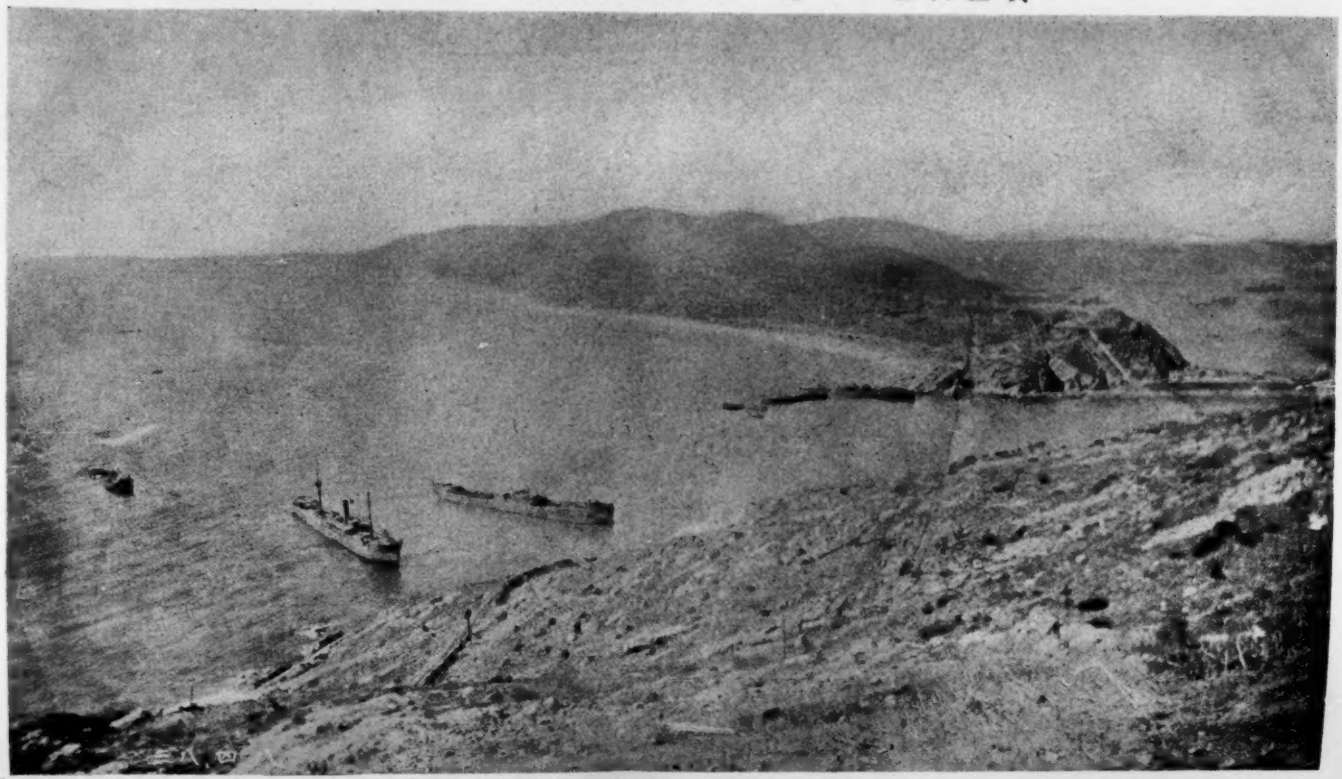
Another very practical application of the method of study outlined is the determination in peace of the important points which in war will offer to an enemy resisting power not commensurate with their strategic importance, and points where offensive facilities may be sadly needed. After such determination the obligation to strengthen as much as possible the weak points is clear. True, the counsel of naval officers regarding national defence is not assigned great weight by our government in time of peace, but all the more reason that such counsel should be based upon correct reasoning and careful study. All too frequently the counsel of those in authority from time to time is widely variant, even in essential features, and even the little weight that might be given such counsel by the government is destroyed by its lack of concurrence. Our country alone among the great naval powers refuses to acknowledge the combined wisdom of all the others as exemplified in their recognition of the necessity of possessing a naval general staff. This imposes an enormous handicap upon our navy, but we cannot accept this handicap with complacency and without making every effort to compensate for it. The fact that we *are* handicapped by having no naval general staff makes it all the more imperative that we do all in our power to build up a service school of thought upon all phases of the science of war that will guide us in our hour of trial.

A naval officer cannot excuse himself for neglecting his duty by charging others with neglect, and it *is* the duty of naval officers

to so prepare themselves that their counsel upon the strategy of national defence, both peace strategy and war strategy, may be sound, reasonable and ready, and that their actions in war may be based upon correct principles interpreted by trained minds. This is true alike of those holding responsible positions and those in humbler places, for it is as essential that subordinates be able to properly understand and correctly interpret the plan of a senior, as it is that the plan itself should not be founded on faulty principles. The lieutenant of the present is the admiral of the future, but it requires more than natural ability, time and the efficient performance of the peace duties of the junior grades to convert even the capable lieutenant into the efficient war admiral. Study of the science of war and practice in the peace substitutes of the art of war are the essential aids to the realm of higher command in war. That these aids themselves are fascinating only emphasizes the shortsightedness of those officers who neglect to utilize them.

JAPANESE BLOCKING SHIPS OUTSIDE OF PORT ARTHUR AS SHOWN FROM THE TOP OF GOLD HILL

黃金山上ヨリ見タル旅順港口外ニ於ケル我カ閉塞船



千代丸 Chiyo Maru　福井丸 Fukui Maru　彌彦丸 Yahiko Maru　米山丸 Yoneyama Maru　報國丸 Hokoku Maru

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THE OPERATIONS AROUND PORT ARTHUR

Part II. Including the Sixth Attack

THE OFFICIAL VERSION OF THE JAPANESE GENERAL STAFF

Translated by Captain W. T. Hoadley, U. S. M. C.

THE FOURTH ATTACK ON PORT ARTHUR

The Movements of the Combined Fleet

After the third assault on Port Arthur, Admiral Togo on February 27, arrived at the southwest coast of Korea. The following day he wired a request to Imperial Headquarters that in accordance with previous plans he desired ships for the blockade. Admiral Dewa with the first division was dispatched to Kaiyo Island, and on February 29 was able to report the conditions at that place. The same day orders were received from Ito, chief of staff, to wit: To be conducted under the direction of the third division. (The third division was not incorporated into the combined fleet until March 4.) Previously the third division under command of Admiral Kataoka was operating to the southward of Vladivostok where the ships of the enemy were and he also guarded the Straits of Korea. In addition, this division watched over the army transports in the neighboring seas. Admiral Togo ordered the seventh division, on March 1, to proceed to the southwest coast of Korea. He directed Admiral Kataoka with the third division to continue in duties of the other division. Admiral Kamimura was ordered to reconnoiter in the vicinity of Vladivostok. Admiral Hosoya with the seventh division was ordered to guard the Daidoko (river) and to cover the landing of the army. At this time the ships in Port Arthur were *Tsarevitch, Pallada* and *Retvisan* and others, mostly repair ships. Vice Admiral Mahkaroff was in command of the naval forces and this fact served to renew the spirit of the Russian fleet. (Mahkaroff assumed this office March 8.) Admiral Togo decided to attack Port Arthur and left with the first, third and fourth divisions. The same day he dispatched orders to

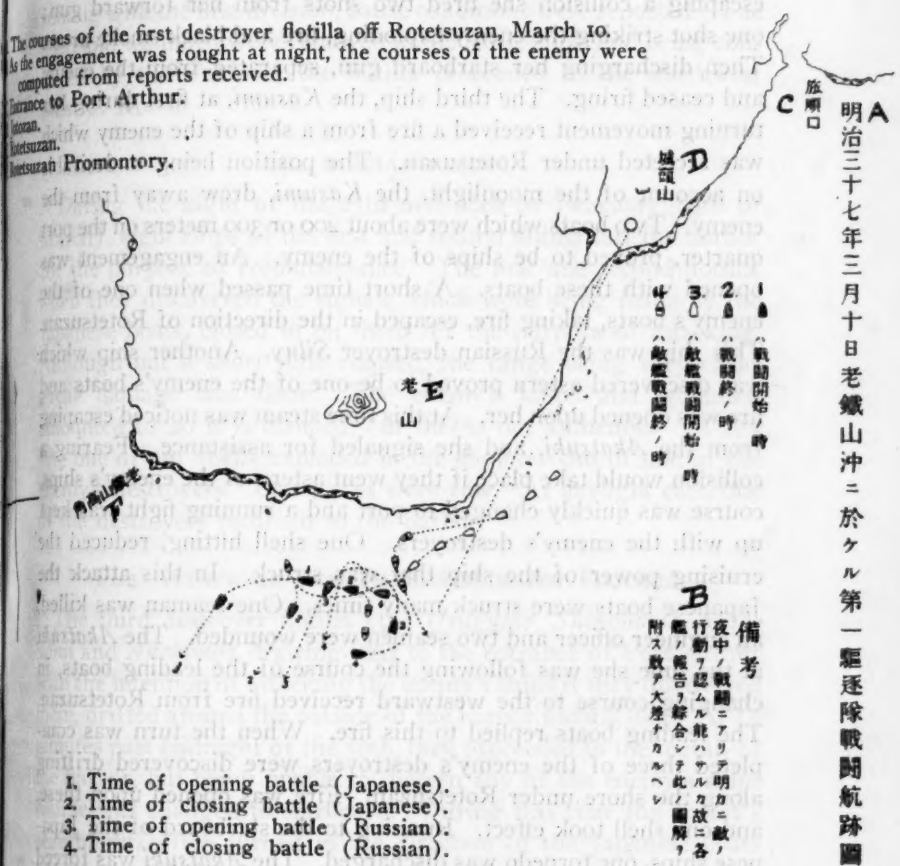
Admiral Uriu, relating to the fourth attack. On account of unfavorable weather the operations were not opened until the 7th. At 7 a. m. the seventh division (*Heien* and *Atago* absent) proceeded to Daidoko, and at 9 a. m. the third division (*Kasagi* and *Yoshino* absent, and the *Tokiwa* added), the first division and first destroyer flotilla left the harbor and anchored the following morning at 8 a. m. off the northwest coast of Korea. Admiral Uriu with the fourth division had already arrived at this place. All the divisions to take part in the attack had gathered. At 4.40 a. m. on the 9th, the third division got under way. Following this division the first and fourth divisions and the first and third destroyer flotillas, taking up a prearranged formation, proceeded to Port Arthur, at which place they arrived at 6 p. m. Commander-in-Chief Togo wished to destroy the enemy's scouts at once. He made signal which read, " We pray for your success," and ordered the destroyer flotillas to take the lead. The first, third and fourth divisions changed course to the southward. The *Tatsuda* and *Chihaya*, after escorting the destroyers, separated from them and joined the main fleet.

THE ATTACK OF THE DESTROYERS FLOTILLA

THE CHALLENGE OF THE FIRST DESTROYER FLOTILLA

The first flotilla (*Shirakumo, Asashio, Kasumi* and *Akatsuki*) in order to deliver an attack on the enemy's scouts, at 11.20 p. m., March 9, proceeded to Rotetsuzan and separated at a point about one sea mile from the shore. They waited for the enemy to appear in the east or west. The following morning at about 2 a. m., on account of the moon rising, speed was decreased. At 4.20 a. m., sighting the western portion of the promontory on the starboard beam, cruised to the eastward, but received a signal from the *Kasumi*, the commander fearing discovery by the enemy, decided to hide under the shadows of Rotetsuzan; turning to port cruised to the westward. At 4.35 a. m., the *Shirakumo* and *Asashio* had finished the turning movement, but the movement was half completed by the *Kasumi*. The *Akatsuki*, throwing over her wheel at the time she was describing a circular course, was struck in the stern by the *Shirakumo*. Hearing sounds of firing the commander knew that the enemy were coming to attack. The Japanese ships were now in the moonlight. The ships of the enemy were hidden by the shadow of the mountain. The enemy's tor-

pedo-boats, one after another, decreased the distance between the rear boats of the Japanese and themselves. The commander of the Japanese boats, considering his formation and the disadvantage of being in the moonlight, decided to take a better position. Increasing his speed he cruised to the westward. The sound of



firing became greater. The *Shirakumo* was unable to follow her companion ships and changed her course. The third ship, the *Asashio,* at 4.37 a. m., discovered what appeared to be three of the enemy's torpedo-boat destroyers. One of these ships at once opened fire at a distance of about 200 meters off the starboard quarter. At once the battle was opened. The enemy, continuing the fire, going astern of the *Asashio,* appearing to port fought

fiercely. During this time the Japanese fire was very effective. Eight shots of the enemy taking effect killed one seaman and wounded three. The enemy seemed to have destroyed a boiler as suddenly white smoke burst forth from the ship's bow. The *Asashio,* seeing this, quickly changed course to port. Narrowly escaping a collision she fired two shots from her forward gun; one shot striking the enemy exploding, fire and black smoke arose. Then discharging her starboard gun, separated from the enemy and ceased firing. The third ship, the *Kasumi,* at first during her turning movement received a fire from a ship of the enemy which was secreted under Rotetsuzan. The position being undesirable on account of the moonlight, the *Kasumi,* drew away from the enemy. Two boats which were about 200 or 300 meters on the port quarter, proved to be ships of the enemy. An engagement was opened with these boats. A short time passed when one of the enemy's boats, taking fire, escaped in the direction of Rotetsuzan. This ship was the Russian destroyer *Silny.* Another ship which was discovered astern proved to be one of the enemy's boats and fire was opened upon her. At this time steam was noticed escaping from the *Akatsuki,* and she signaled for assistance. Fearing a collision would take place if they went astern of the enemy's ships, course was quickly changed to port and a running fight was kept up with the enemy's destroyers. One shell hitting, reduced the cruising power of the ship that was struck. In this attack the Japanese boats were struck many times. One seaman was killed, an engineer officer and two seamen were wounded. The *Akatsuki* at the time she was following the course of the leading boats, in changing course to the westward received fire from Rotetsuzan. The leading boats replied to this fire. When the turn was completed three of the enemy's destroyers were discovered drifting along the shore under Rotetsuzan. Fire was opened upon these, and one shell took effect. Running to the starboard of the Japanese ships, one torpedo was discharged. The *Akatsuki* was forced to change course to starboard in order to avoid a collision. The enemy at a distance of 400 meters passed astern and came out on the port side. The *Akatsuki* had her boilers damaged. Two of the enemy's ships, taking advantage of this, attacked her, damaging her engine and decreasing her speed. By a rocket signal her companion ships went to the rescue. At this time from ahead three of the enemy's ships appeared and opened fire, but fortu-

nately no damage was done. At 20 minutes past 5 o'clock the Japanese boats were able to join the main fleet. During this engagement four men were killed and two injured. Now, as the various ships of the first torpedo flotilla had already joined, the return route was taken, and at 8 o'clock on the morning of the 10th, joining with the first division, battle conditions were reported. The dead and wounded were removed to the battleships, and being convoyed by the *Tatsuda*, the flotilla proceeded to the northwest coast of Korea.

THE RUSSIAN REPORT

During the night of the 25th and 26th of February (9th of March), eight ships of the first and second flotilla left the harbor for the purpose of reconnaissance. The first and second flotilla, when they discovered the signals which were being made by the Japanese boats, closed in on them for the purpose of attacking. Although but a short time elapsed, the range being very close, great damage was done. The enemy's killed and wounded amounted to 20 it is claimed, but this is not authentic. At any rate one of our shells exploded in the engine-room of one of the enemy's destroyers. Our losses were few. At daylight each one of the destroyers returned to the harbor.

THE ATTACK OF THE THIRD DESTROYER FLOTILLA

The third destroyer flotilla (the *Usugumo, Shinonome, Sazanami* and *Akebono*) drawing near to the entrance of Port Arthur with the intention of attacking the enemy's ships if they discovered them, drifted around the outside of the harbor unmolested. At 15 minutes past midnight of the 10th, they proceeded to the mouth of the harbor, but being unable to discern any of the enemy's ships course was changed to starboard. During this time the enemy's searchlights often turned in the direction of the Japanese boats but they were not discovered. A short time afterwards, coming within the rays of the searchlights the batteries opened fire with large and small caliber guns. The flotilla, in order to join the main fleet, at 7 o'clock proceeded to the south of Rotetsuzan. In the east and south they discovered two of the enemy's torpedo-boat destroyers hurriedly cruising towards the harbor. These boats were pursued to the west of the promontory of Rotetsuzan, but, being fired upon by the shore batteries, could not carry out an attack.

They took a course which would bring them ahead of the enemy's boats, but the enemy conjecturing this, quickly changed course to the southeast and headed in the direction of Rotetsuzan. The third flotilla, forming in a single line ahead, pressed on them more closely. As the enemy seemed about to escape to the starboard side of the Japanese ships, a line abreast was formed, and on a parallel course engagement was opened. Two of the enemy's boats were greatly damaged. At 5 minutes past 8 the engagement was stopped, each boat reporting their casualties. The *Akebono* took the wounded and transferred them to the *Tokiwa*. The *Sazanami* took over the captives. Five sailors, under the command of two officers, in a small boat, put off to rescue some of the crew of the sinking boats of the enemy. The enemy seeing this, lowered their battle-flags and surrendered. An officer, going aboard the enemy's destroyer, hoisting the Japanese battle-flag, took over the ship. The lower deck was awash; the upper deck was smeared with blood. Two sailors who were found to be alive at 5 minutes past 9 were rescued. At this time the *Novik* and the *Bayan* proceeded to the scene of the disaster. The shore batteries opened fire. Orders were received from Admiral Dewa that the work of rescue would be stopped. At 10 o'clock in the morning at a point seven sea miles east southeast of Rotetsuzan lighthouse, the Russian destroyer at last sunk. During this engagement the *Usugumo* had no casualties. The *Shinonome* had two men wounded. The *Sazanami*, being struck by seven or eight shots, one sailor was killed and one wounded. The *Akebono*, on account of her position between the enemy's lines, received many shells, bringing about a number of wounded.

THE RUSSIAN REPORT

On the 26th day of February (the 10th day of March) the first flotilla, together with two boats of the second flotilla engaged in reconnaissance. On the following morning the ships of the enemy opened up a severe gun-fire, and a half hour passing our ships returned to the harbor. At this time Admiral Mahkaroff ordered the *Novik* to the rescue. One shot striking one of our boats in the engine-room, she became disabled. At daybreak the Japanese flotilla, drawing near, opened a murderous fire on this boat. One shot killed the commander and created great disaster to the crew. At this time the *Novik* coming quickly to the rescue, drove off the

A. Courses of the third destroyer flotilla off Port Arthur, March 10.
B. Japanese main fleet.
C. Russian fleet.
X. Position of the Japanese fleet when the enemy were discovered.
Y. Position of the enemy when discovered.

Japanese flotillas. A little later four of the enemy's cruisers appeared and opened fire on the *Novik*, which ship was forced to retreat to safety.

THE ATTACK OF THE VARIOUS DIVISIONS

INDIRECT FIRE

March 10, the first, third and fourth divisions proceeded in the direction of Rotetsuzan Promontory. Commander-in-Chief Togo, ordered the third division to reconnoiter the harbor entrance and he ordered the fifth and fourth divisions to drift to the southward of Rotetsuzan. Falling in with the first torpedo-boat flotilla he received report of the battle. He gave directions for the *Hatsuse*, the *Shikishima* and the *Yashima* to open an indirect fire. He ordered the fourth division to proceed in the direction of Dalny Bay. The *Chitose* was ordered to reconnoiter Pigeon Bay. The *Hatsuse, Shikishima* and *Yashima* at once left for the south of Rotetsuzan to take up the attack. At 8 minutes past 10 o'clock in the morning, the *Hatsuse* opened engagement. The other ships followed suit. Shells were dropped over Rotetsuzan into the inner harbor. The attack was kept up for some time until the batteries on Gold Hill opened fire. At 30 minutes past noon fire was stopped and the ships cruised to the southward of Rotetsuzan. The first section, the *Mikasa, Asahi* and the *Fuji*, took their place and at 52 minutes past noon the *Mikasa* opened fire, followed by the *Asahi* and the *Fuji*. At 46 minutes past 1 o'clock, after firing the allotted number of shells, joined with the other section of the first division and cruised to the southward of Round Island.

THE ATTACK ON SANZAN ISLAND

The fourth division (the *Takachiho, Niitaka, Naniwa* and *Tsushima*) received orders to destroy the signal stations of the enemy on Sanzan Island, and at 40 minutes past 8 o'clock on the morning of the 10th, separating from the other divisions, proceeded to Dalny Bay. On the way they received a message from Commander-in-Chief Togo to proceed to Rotetsuzan at full speed and attack the enemy's destroyers. At once heading in that direction, at 9.30 they arrived outside of Port Arthur. Admiral Uriu went to aid the *Sazanami*, but finding there was no necessity again proceeded to Dalny Bay at 22 minutes past 10 o'clock. In the

afternoon arrived in the vicinity of Sanzan Island. Reconnoitering the interior of the island at the rear of the lighthouse they found a great many dwellings. The various ships opened fire on all the buildings. On account of the high seas a landing force could not be sent ashore. At 15 minutes past 2 o'clock they proceeded in the direction of Round Island.

THE FIFTH ATTACK ON PORT ARTHUR

THE MOVEMENTS OF THE DIVISIONS IN VARIOUS PLACES

Commander-in-Chief Togo, after the fourth attack on Port Arthur, on March 11, proceeded to the northwest coast of Korea. The enemy's ships, after the departure of Togo's fleet, left the harbor and it was reported that there was a possibility of their escaping to Vladivostok. Warnings of this move were sent to Admiral Kataoka of the third division which was in the Straits of Korea and to Admiral Kamimura of the second division which was operating against the enemy around Vladivostok. Admiral Dewa with the first division was ordered to reconnoiter the enemy. On the morning of the 15th Admiral Dewa with the third division proceeded to Port Arthur. (The *Chitose, Takasao* and *Tokiwa.*) At 8.40 on the 16th, at the harbor entrance, in the smoke and mist, recognized a ship of the *Pobieda* type and the *Retvisan, Bayan* and *Novik.* In the inside of the harbor he was able to assure himself of the fact that the enemy's main fleet was there. These facts were wired to the commander-in-chief. At 10 a. m., again drawing near the harbor on account of the smoke and mist settling down, reconnaissance was impossible so he returned. Commander-in-Chief Togo knew now that the enemy's main fleet was in Port Arthur. (Commander-in-Chief Mahkaroff, for the purpose of maneuvers, with over 30 ships left on the 11th and on that evening returned to Port Arthur, according to rumors.) After the return of the second division, the *Kasagi* and *Yoshino,* from Port Arthur, the fifth attack was decided upon. On the 20th Admiral Kamimura of the second division and the subordinate commanders repaired to the *Mikasa* and received orders relating to the new movement. That night at 5 p. m. the first, second and third divisions, and the fourth and fifth destroyer flotillas left the harbor and during the night anchored. The following day the third division followed by the others, got under way and proceeded to Port

Arthur. At 6.40 p. m. when they arrived at the designated place, the destroyers separating, reconnoitered the enemy.

MOVEMENTS OF THE VARIOUS UNITS

THE RECONNAISSANCE OF THE DESTROYERS

The fourth (the *Hayadori, Murasame, Asagiri* and *Harusame*) and the fifth (*Kagero, Murakumo, Yugiri* and *Shiranubi*) destroyer flotillas, under orders to reconnoiter the enemy, on the afternoon of March 21 separated from the main fleet and cruised away on a prearranged course. The fourth flotilla forming into two sections at 10.50 proceeded to the harbor entrance. The enemy's searchlights lighted the right and left of the entrance. The moon sinking later the destroyers went out of range of the searchlight's rays. This flotilla, at 30 minutes past midnight of the 22d, when at a point about two thousand and some hundred *yards* from the harbor entrance was fired upon by the enemy's scout ships as well as from the land batteries. The *Hayadori*, heading for one of the scouts, discharged a torpedo and headed seaward. The *Harusame* was also fired upon numerous times. At 30 minutes past 1, the boats gathering, proceeded to the south of Rotetsuzan. Commander Nagai wished to attack the signal stations on the north side of Pigeon Bay but at 6.20, when he approached the entrance to the bay, he received a message from the *Harusame* which read: "The fifth flotilla is engaged with the enemy's destroyers." With full speed he proceeded to the entrance but could see no ships of the enemy; the fifth flotilla only was visible cruising to the southward. At 9 o'clock he proceeded to the southward of Rotetsuzan and joined the first division. The fifth flotilla at 10.30 p. m. on the night of the 21st proceeded to the eastward in hopes of picking up the enemy. During the night proceeded to the harbor entrance. At 5 a. m. on the 22d, arrived at a point about one and one-half sea miles southeast of the entrance. At this time the enemy extinguished the searchlights on Gold Hill and neighboring points. The flotilla advanced to an attacking point, taking advantage of the darkness. Suddenly the flotilla was fired upon by several of the enemy's destroyers and at the same time the searchlights were trained upon them. Hereupon the flotilla losing the opportunity retreated to the open and proceeded to Dalny Bay, searching for the enemy's destroyers. At 9 o'clock joined the first division.

THE INDIRECT FIRE OF THE FIRST DIVISION

Commander-in-Chief Togo, after giving orders to the destroyer flotillas, on the afternoon of March 21, directed the second division to take up duties assigned them. He, with the first and third divisions, proceeded to Port Arthur. He was joined by the fourth and fifth destroyer flotillas at 8.30 a. m. the 22d, after they had completed their reconnaissance. He ordered the third division to proceed to a point outside the entrance. At 9.15 a. m. the *Fuji* and *Yashima* were ordered to leave the line and conduct an indirect fire. The other ships cruising off Rotetsuzan watched for the enemy. The *Fuji* and *Yashima* at 9.30 a. m., finishing battle preparations, advanced to their firing positions. At a point just above the lighthouse on Rotetsuzan, what appeared as large mortars were discovered and numbers of the enemy's troops appeared and disappeared. The *Fuji* at 10.29 began the attack. The *Yashima* taking position north of the *Fuji* opened fire at 10.45. Both ships firing the authorized number of shells put to sea and joined the first division. The enemy returned the fire with great severity and as many as 24 shots were dropped. The enemy from previous attacks had planned to plot the position of the ships in order to return the fire. It was reported that the shots of the ships caused considerable damage in the town.

At the time the *Fuji* and *Yashima* were engaged in the indirect fire attack, the other ships of the first division were watching for the enemy. The third division with the same object in view proceeded to a point outside the harbor entrance. At this time the *Bayan* alone was outside the harbor. Later the *Novik, Askold* and *Diana* following, proceeded to seaward. Black smoke arising from within the harbor seemed to indicate that the other ships were about to leave. Admiral Togo observing these conditions wired the second division to join at full speed. The *Tatsuda* was ordered to proceed to the mouth of the harbor and observe the enemy. At 10.42 a. m. the *Petropavlovsk* appeared, then the *Poltava* and leaving the harbor joined with the other ships. Making single line ahead moved to Manjuzan. Three gunboats and a number of destroyers were with the line. The battleship *Retvisan* which was inside the harbor replied to the fire of the *Fuji* and *Yashima.* At 15 minutes past noon the *Sevastopol* left. The *Pobieda* and *Peresviet* also left. Next the battleship *Tsarevitch, Retvisan* and the cruiser *Pallada,* the remainder of the fleet, left.

The officers of the Japanese fleet were desirous of engaging in battle at once. The enemy showed an inclination to stay under the cover of the shore batteries. When the indirect fire had ceased, Admiral Togo at 1.40 p. m. gathered his ships. Previous to this the enemy's fleet returned. The first and second divisions on the 23d arrived at the northwest coast of Korea. They were joined by the third division and the destroyer flotillas. The ships for the second blockade were already at anchor there. The first and third destroyer flotillas and the ninth and twentieth torpedo flotilla and one transport arrived and joined the main fleet.

THE SIXTH ATTACK ON PORT ARTHUR AND THE SECOND BLOCKADE

PREPARATIONS FOR THE BLOCKADE

The combined fleet attempted a blockade previously, but knew that the result was of no value by the way the enemy's ships left and returned to the harbor. Admiral Togo again planned to blockade the harbor. On the 27th when he arrived southwest of Korea he wired to the Imperial Headquarters that he be given ships for the blockade. The *Chiyo Maru, Fukui Maru, Yahiko Maru* and the *Yoneyama Maru* were put in preparation at the Naval Station at Kure. On March 18, orders were issued by Admiral Togo to collect the crews for the blockading ships. All below the commissioned rank who had taken part in the previous blockade were not to be considered, as their lives had once been jeopardized. Commissioned officers who had taken part in the previous blockade were permitted to volunteer. Of the volunteers, numbering over a thousand from the various ships of the first and second divisions, about 50 were chosen. The preparations of the second blockade were now complete.

THE SHIPS' MOVEMENTS

Admiral Togo arrived off the northwest coast of Korea on the morning of March 23. The fifth attack at this time had been finished. Admiral Kamimura and the other commanders gathered on the *Mikasa* to discuss plans for the second blockade. The result of the discussion brought about the following orders relating to the sixth attack and the second blockade: The combined fleet will again carry out a blockade on Port Arthur. The first and

second divisions, the first, second and third destroyer flotillas and the ninth torpedo flotilla acting as convoy to the blockading ships will leave on the morning of the 24th. The *Karigane* will convoy the *Chiyo Maru*. The *Tsubame* the *Fukui Maru*. The *Kasasagi* the *Yahiko Maru*. The *Manazuru* the *Yoneyama Maru*. That evening the second destroyer flotilla will, with increased speed, if they discover the enemy's scouts, attack them. Arriving at a point south of Rotetsuzan at 3 a. m. the 25th will search for the enemy in that vicinity. The first and third destroyer flotillas, arriving in front of the harbor entrance, at the time of the blockade, if discovered by the enemy, will at once turn on their searchlights and open fire to confuse the enemy. This flotilla after the blockade will aid in picking up the survivors. Two boats of the ninth torpedo flotilla will proceed the blockading fleet forward of and in the left wing, and will engage any of the enemy seen. The other boats will protect the left wing, and upon arriving at the harbor entrance will stand by to pick up survivors. The third division, by a detour, will arrive outside on the morning of the 25th and pick up survivors, as well as ascertain the effects of the blockade. The first division at Encounter Rock will look after any movement of the enemy's main fleet. The second division, the fourth and fifth destroyer flotillas will await orders off the northwest coast of Korea. The movement of the combined fleet was opened at 6 a. m. on March 24. The third division got under way, but at the time the first division was prepared to depart the mist settling down made navigation impossible. In addition a strong northwest wind caused heavy seas. Admiral Togo ordered the third division to return. On the 25th, the weather becoming clearer and the wind decreasing, the blockading ships with the *Tatsuda* and ninth torpedo flotilla left in the afternoon. On the morning of the 26th the other units got under way. The third division leading followed by the first division and the first, second and third destroyer flotillas followed the blockading ships. When they arrived at the previously arranged position the first and third divisions, separating from the blockading fleet, manned the sides and shouted three banzais.

THE ADVANCE OF THE BLOCKADING SHIPS

At 6.30 p. m. on March 26, after separating with the first and third divisions, the blockading fleet convoyed by the destroyer flotillas advanced. At 2 a. m. on the 26th arrived to the south-

ward of Rotetsuzan. The *Chiyo Maru, Fukui Maru,* the *Yahiko Maru* and *Yoneyama Maru* in the order named proceeded to the entrance. At this time, the fog and waning moonlight favored the ships. Increasing the speed, the ships fearlessly made for the entrance. At 3.30 a. m. the *Chiyo Maru* was first discovered by the enemy. Fire was opened by the scout ships and land batteries. Searchlights were turned on from three directions, blinding the crew. The commander of each ship standing on the bridge of their ships encouraged their crews. The objective of the *Chiyo Maru* was the lighthouse on Gold Hill. Being bothered and unable to fulfill her objective, at last drawing near to the seashore under Gold Hill, dropping anchor in the channel at the entrance, with the ship's head pointing to the shore, she was blown up. The second ship, the *Fukui Maru,* seeing the explosion on the *Chiyo Maru,* went to port of her, and at the time she was about to anchor was struck by a torpedo of the enemy, which tore her bottom. At the same time as this the explosion internally happened. Filling rapidly she sunk on the port hand of the *Chiyo Maru.* The third ship, the *Yahiko Maru,* was blown up on the port side of the *Fukui Maru.* The fourth ship, the *Yoneyama Maru,* drew near the harbor entrance, was blockaded by a destroyer of the enemy passing ahead. Going astern and to the starboard of the *Chiyo Maru,* passed between that ship and the *Fukui Maru,* and dropped anchor, but the momentum was so great the anchor refused to hold. Releasing the other anchor, was about to detonate the charge when she was torpedoed. Turning the ship's head to the west she was sunk across the channel. The crews all taking to the small boats were subjected to a severe fire from the enemy, especially from the land batteries which poured an incessant fire on the survivors with rifle and machine gun-fire. The commander of the *Fukui Maru,* Lt. Commander Hirose, with his crew took to the boats. One man named Sugino was found missing. He had been detailed to ignite the powder to detonate the charge for explosion. Lt. Commander Hirose again returning to the ship loudly called his name and searched about. Being unable to find any trace of the man he was forced to return as the ship was sinking. When he again entered the small boat he was struck by a shell which completely blew him to fragments. Only a shred of flesh was found.

THE RUSSIAN REPORT

After the first Japanese blockade, we, in order to hinder a further attempt, caused two steamers to be sunk. In the daytime, in order to permit the destroyers to enter and have the harbor, there was an opening made between the defence booms, located between the above mentioned steamers. At night-time these avenues were closed. When the entire fleet left, the booms were removed by the harbor department. In addition, booms were stretched between two gunboats and the shore. Also at night strict watch was kept by small steamers and junks. On March 13 (March 26) Commander-in-Chief Mahkaroff with the fleet left the harbor for the purpose of maneuvers, and returned the same day. During this day the *Peresviet* and the *Sevastopol* collided and although the damage was not great, the propellers of the *Sevastopol* were damaged, which necessitated her going into dock. The commander of the *Sevastopol* was relieved by Admiral Mahkaroff. During that night four ships of the enemy planning a blockade of the harbor entrance were discovered about 3 a. m. at a distance of two sea miles. A severe fire was opened by the shore batteries. Two destroyers engaged in the duty of reconnaissance attacked these. The *Silny* first discharged a torpedo which exploded under one of the blockaders. Proceeding to another ship torpedoed her. Another ship at the time she dropped anchor was blown up and sunk across the channel in the western portion of the harbor. One ship was sunk under Gold Hill. The *Silny* after finishing the torpedo attack saw lights on the horizon. Proceeding in this direction it proved to be a destroyer of the enemy. Engaged her but as other destroyers appeared, retreated. During her escape she received a shot in her boiler-room and ran aground. The crew of the blockading ships under a severe fire were picked up by their ships which were standing by.

RESCUE OF THE SURVIVORS

The first (*Shirakumo, Kasumi, Asashio* and *Akatsuki*), second (*Ikazuchi, Akebono, Oboro* and *Inazuma*) and the third (*Usugumo, Sazanami* and *Shinonome*) destroyer flotillas, and the ninth torpedo flotilla (*Manazuru* and *Kasasagi* added) convoying the blockading fleet arrived off Port Arthur. From this point the ninth torpedo flotilla conducted the blockading ships. When the blockading fleet entered the harbor entrance the *Hato, Karigane,*

the *Manazuru* and the *Kasasagi* stopped at a point south of the harbor entrance and prepared to pick up the survivors, then the commander of the flotilla proceeded with the blockading fleet with the *Aotaka* and the *Tsubame*. Arriving at a point about one sea mile from the entrance, separated from the blockading ships and waited to pick up survivors. About 4 a. m., the 27th, one of the enemy's destroyers, making signals with lamps, came toward the *Aotaka*. At this time the *Aotaka's* head was headed about west and the *Tsubame* was about 200 meters astern heading northwest. The enemy, when he was about 200 meters from the *Aotaka* opened fire and then passing between the two mentioned ships escaped to the southward. The *Aotaka* porting her helm attacked this boat. The *Tsubame* also attacked. Pursuing her kept up a running fight. Steam poured forth from her smokestack hatch and she seemed to lose her freedom of movement. Continuing the attack she was at last run ashore near Gold Hill. This ship was said to be the *Silny* and that her boilers were destroyed. Her casualties were 17, including her commander. The *Tsubame*, picking up the crews of the *Chiyo Maru* and *Yahiko Maru*, proceeded to sea. The *Aotaka* alone searched for survivors.

The second torpedo-boat flotilla on the 26th separating from the main fleet in the darkness proceeded, acting as advance guard of the blockading ships, but were unable to discover the enemy. The following morning at 30 minutes past 1 o'clock appearing to the south of Rotetsuzan, searched for the enemy. The first and third flotillas, advancing, covered the fleet. About 3 o'clock on the morning of the 27th arrived outside the entrance of Port Arthur. The first flotilla were to the southward and the third flotilla took position to the south of the harbor entrance. A short time passing, hearing gun-fire in the direction of the harbor entrance knew that the blockade had begun. As arranged beforehand, the first flotilla threatened the enemy. At 30 minutes past 6 the *Kasumi* of the first flotilla discovered a boat of the *Fukui Maru* and picked it up and in order to provide for the treatment of the wounded she separated from the other boats and proceeded to the first division. The other three boats, the *Shirakumo, Asashio* and *Akatsuki*, in order to find out the result of the blockade, proceeded to the harbor entrance. Although being subjected to the severe fire of the enemy, there was no loss. Each ship, after taking part in the rescue of the sailors of the blockading ships until 9 o'clock in the morning, joined the first division.

THE ASSISTANCE OF THE FLEET

The first and third divisions after covering the route of the blockading fleet separated. The third division at 30 minutes past 6 in the morning of March 27, sighted Rotetsuzan, and increasing speed proceeded to a point off the entrance of Port Arthur. At this time the enemy's ships, the *Novik* and *Bayan,* and also the land batteries, fired on the rescuers. The *Karigane* and *Kasasagi* of the ninth torpedo flotilla came close aboard and reported that there were a number of wounded among the blockading fleet. Admiral Dewa directed the *Asama* to leave the line and go to their assistance. At this time, the *Askold* which was cruising to the east and the *Novik* which was cruising to the west both bombarded the Japanese ships, projectiles falling short. From 5 minutes past 8 the enemy's ships one after another appeared outside the harbor. The *Petropavlovsk* leading, the *Poltava, Pobieda, Askold, Bayan, Diana* and *Novik* following, forming in single line ahead, cruised to the southwest. Previous to this the first division cruised in the direction of Port Arthur. On the way met with the rescuing ships. Commander-in-Chief Togo ordered the first division to drift about and pick up the members of the blockading fleet. He also ordered the ninth torpedo flotilla and the *Kasuga Maru* to proceed to the northwest coast of Korea. When he saw the *Petropavlovsk* leave the harbor he became convinced that the second blockade was a failure. He, joining with the third division on the 28th, arrived at the northwest coast of Korea.

THIS ANCHOR WAS PICKED UP
BY THE U. S. S. LACKAWANNA
CAPTAIN J. H. GILLIS MAY 1881
AT THE ISLAND JUAN FERNANDEZ
ROBINSON CRUSOE'S ISLAND

FIGUREHEAD YORKTOWN IN BACKGROUND

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE *CENTURION'S* ANCHOR

By Rear Admiral C. A. Gove, U. S. Navy

In May, 1881, the U. S. S. *Lackawanna,* then making a cruise in the South Pacific, anchored at the island of Juan Fernandez (Robinson Crusoe). Upon our departure while heaving up the anchor, it was noticed that it came up very heavy and on being sighted an ancient anchor (see illustration) was found hanging on one of the flukes. Upon our arrival at Mare Island, the anchor was landed and placed in the park with the other objects of interest and is there at the present day.

A short time ago I was reading "The Voyages of Lord Anson, 1740." The narrative states that the squadron after rounding Cape Horn put in to Juan Fernandez to refit; the *Centurion,* the flagship, anchored in 40 fathoms of water on the following bearings: West Point NW. by W. East Point East ½ South, head of the Bay SSW. All magnetic. One afternoon during a heavy squall off the land the cable parted and the *Centurion* was blown out to sea. Upon the return of the ship several days were spent in sweeping and dragging for the anchor without success.

The bearings of the anchorage of the *Lackawanna* were obtained from her log and plotted, the difference between the positions of the *Centurion* and the *Lackawanna* being about 135 yards.

The following facts would seem to indicate that the anchor picked up by the *Lackawanna* was the lost anchor of the *Centurion.*

(a) The anchor is of English design of that period.

(b) That it had been in the water for a long time is evidenced by the iron being eaten away as shown in the photograph.

(c) That it is a large anchor; the *Centurion* was a large ship of that period, carrying a crew of over 800 men.

(d) That the difference in the positions of the two ships could be accounted for by the change of variation, by the probable change of the eastern and western points and by the crudeness of the compasses and means of taking bearings in those days.

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THE UNITED STATES NAVY IN MEXICO, 1821-1914

By LOUIS N. FEIPEL

CHAPTER V

WAR WITH MEXICO—OPERATIONS ON THE EAST COAST, 1845-1848

Having followed the naval operations on the west coast of Mexico from the beginning to the close of hostilities for the sake of preserving a clearer and more convenient method, we will now, in the same way, consider the services of this arm of the national power in the Gulf and on the east coast of Mexico. In that quarter, our navy found no enemy to contend with on its own element, and was, therefore, principally occupied as an auxiliary to the army. And although its services were not brilliant, they were certainly indispensable.

In July, 1845, the Secretary of the Navy wrote to Commodore Conner, commanding the Home Squadron, that he must now consider Texas as a part of the United States, to be defended as any other portion should be, and that he must hold his force in readiness for any contingency. The vessels of war embraced in his command at this time were: The frigate *Potomac,* sloops-of-war *Falmouth, Saratoga, St. Mary's,* brigs *Somers* and *Lawrence.* The steamers *Mississippi* and *Princeton,* sloop-of-war *John Adams,* and the brig *Porpoise,* were ordered to join his squadron without delay.

During the movement of General Taylor's division to Corpus Christi, and thence on to the north of the Rio Grande, the smaller vessels of the squadron kept it company, and rendered some valuable services. When hostilities actually began and a state of war was declared to exist, instructions were issued to Commodore Conner to employ his command in the blockade of Mexican ports, so far as its force would admit of doing so effectually. The

government required that the blockade should be actual and absolute, except against the vessels of war of neutral nations. These orders were issued on the 13th of May, 1846, and that they might be properly carried out, several additional vessels were attached to the squadron. These were the frigate *Cumberland,* frigate *Raritan,* and the brigs *Perry* and *Truxton.* The sloop-of-war *Albany* also joined the squadron during the year.

On the 8th of May, the firing of the artillery at the battle of Palo Alto was heard at Point Isabel, where the squadron was lying. Major Munroe, commanding the post, and having under his care the supplies for the army, apprehensive of an attack by the enemy upon so important a point, requested of Commodore Conner a reinforcement of his troops from the squadron. This was promptly granted, 500 seamen and marines, under Captain F. H. Gregory, of the *Raritan,* being landed and assigned a position behind the defences. But the victories of the 8th and 9th drove the Mexicans across the river, opened the communications between Fort Brown and Point Isabel, and left the latter free from all danger.

On the 18th of May, a detachment of nearly 200 marines and seamen from the *Cumberland* and *Potomac,* under Captain J. H. Aulick, sailed up the Rio Grande in the boats of the ships and effected a junction with a detachment of the army at Barita, on the right bank of the river, about 15 miles from its mouth. At this point they established a post without any opposition, and on the same day the army under General Taylor crossed the river and entered Matamoros.

After this, the vessels were despatched to their several stations to enforce the blockade of the ports of Mexico on the Gulf as far south as Alvarado. The changes of the ships on the several stations were necessarily frequent, repairing, as they did, for a time, successively to Pensacola to replenish their supplies. The *Somers* was sent to Yucatan to ascertain what course that government intended to pursue in the war between the United States and Mexico. The honest neutrality of this province would require a less extent of coast to be guarded, and diminish the resources of Mexico for a prolonged contest. Munitions of war were, however, being introduced into Mexico through this province, so that the necessary neutrality was not maintained; and it became advisable, therefore, in the autumn of this year, to send an expedition

to Tabasco, through which city the commerce in the war materials was carried on.

Tabasco was situated on the river of the same name, about 74 miles from its mouth, and in a southeasterly direction from Vera Cruz. Its seaport, called Frontera, is situated at the mouth of the river. Commodore Matthew Calbraith Perry was appointed to conduct the expedition. As the harbors of Mexico were inaccessible to most of our ships of war in consequence of sand bars across their entrances, several small steamers and schooners had been purchased and sent to the scene of operations in the Gulf. Of these, Commodore Perry took the steamer *Vixen* and the schooners *Bonita, Reefer* and *Nonata,* besides the steamer *McLane* and the schooner *Forward* of the revenue service, as the most available force with which to ascend the river. His own ship was the *Mississippi,* a steam frigate, on board which was a detachment of 200 officers, seamen and marines, under the command of Captain French Forrest of the *Cumberland.* The expedition sailed on the 16th of October and arrived off the mouth of the Tabasco on the 23d. The *Mississippi* was left at the anchorage outside, while Commodore Perry himself went on board the *Vixen.* This small steamer then took in tow the *Bonita* and *Forward,* with the barges containing the detachment under Captain Forrest, and, crossing the bar, began ascending the river. The *Nonata* followed under sail. The *Reefer,* having parted company in a gale, had not as yet rejoined the squadron.

The town of Frontera was taken possession of without resistance, together with several vessels in port, and two steamers which were firing up in the hope of escaping up stream. The largest of these steamers, the *Petrita,* was immediately put in service, the detachment of Captain Forrest embarking in her, and the *Nonata* and *Forward,* with the barges, being attached to her to be towed up the river. The *Vixen* then took the *Bonita* in tow, and the next morning the command again moved forward, hoping to reach Tabasco before additions could be made to its defences. The rapidity of the current, and the imperfect knowledge of the channel, rendered their progress slow. The next morning, however, they came abreast of a fort which commanded the river at a very difficult point, and from which they looked for opposition to their advance. But they passed it unmolested, the men in charge fleeing at their approach. At noon, Tabasco was reached. Several

merchant vessels were secured by the boats, and the squadron anchored in order of battle abreast of the town, within half-musket range.

Captain Forrest went directly on shore with a flag and a summons to the governor to surrender. This was answered with bravado and an invitation to Perry to fire as soon as he pleased. The commodore was extremely reluctant to destroy the town and to subject the inhabitants to the miseries of a bombardment merely to gratify the inhuman pride of a man who, safe himself, would not surrender although incapable of making any effectual resistance. However, it was necessary to make some demonstration of our power, and Perry therefore directed the firing to begin from the guns of the *Vixen* alone, and these to be aimed at the flagstaff. At the third discharge, the flag came down. Captain Forrest being again sent to inquire if they surrendered, was informed that the flag was not struck, but only shot away.

Captain Forrest now landed with his detachment at a point where they were under cover of the guns of the vessels. This movement drew from the enemy a fire of musketry, which was returned by the flotilla and continued till evening. Not considering it safe for the land party to remain on shore through the night, Commodore Perry recalled them. The crews were continued at quarters throughout the night, but the firing from the flotilla was not resumed. Commodore Perry, knowing that the governor disregarded the wishes of the principal citizens in refusing to capitulate, determined, from motives of humanity, to relinquish any plan of a more complete conquest, and to retire from the place, satisfied with having broken up the obnoxious traffic in munitions of war. But in the morning, the firing was reopened from the town, and consequently it became necessary to reply to it from the flotilla.

A flag of truce finally appeared, which was met by Captain Forrest. The bearer brought a communication from the principal foreign merchants of the place, setting forth that they were great sufferers from the bombardment and that they would be ruined if it continued, and desiring the American commander to spare the town and avert such disastrous results. Commodore Perry in his reply expressed his continued determination not to fire unless fired upon from the shore. He accordingly ordered his prizes to move down the river, while the armed vessels pre-

pared to follow. One of the prizes grounded near the shore, whereupon a large party of Mexicans collected in the houses and streets opposite and began to pour into it a very severe fire. This, of course, made it necessary to attack the town again, in order to relieve the prize. The ships' fire soon silenced that on shore, and Lieutenant W. A. Parker, who was in charge of the prize, defending himself with great gallantry, succeeded in getting his vessel off with one man killed and two wounded. Lieutenant Charles W. Morris, while conveying an order in a boat from the commodore to Lieutenant Parker, received a severe wound in the neck, which a few days later resulted in his death. The flotilla, with the prizes, now withdrew from before the town and proceeded down the river. Such vessels found in the river as were of little value, were burned, and the rest of the prizes were sent to the main squadron near Vera Cruz. The *McLane* and the *Forward* (revenue cutters) were left to maintain the blockade of the river, while Commodore Perry and his command rejoined Commodore Conner.

Previous to this successful expedition against Tabasco, some naval movements were in progress which did not have so satisfactory an ending. In August, Commodore Conner planned an expedition against Alvarado, the first town of any importance on the coast to the eastward of Vera Cruz. The expedition failed, however, owing to the fact that none of the vessels were able to cross the bar—the small steamers and schooners, which ultimately proved so efficient in operations of this kind, not having been sent out at that time. When they arrived, in October, Commodore Conner made another attempt to take possession of Alvarado. The defences of the place were by no means insignificant, consisting of several forts and batteries commanding the harbor and its entrance. The steamer *Vixen* towed in the two schooners *Bonita* and *Reefer,* and this division was able to return the fire of the batteries. The *Mississippi* managed also to reach a position where she did considerable execution with her long guns. The steamer *McLane,* however, touched on the bar, and so was unable to bring the second division, consisting of the *Nonata, Petrel* and *Forward,* into action. This misfortune frustrated the plan; for, the first division not being properly supported, it became necessary to recall it.

The blockade of Tuxpan, situated on the coast above Vera Cruz, resulted in the loss of one of the vessels of the squadron. On the 15th of August, Commander E. W. Carpender stood in for the town with the brig *Truxton*. The vessel struck upon the bar and obstinately resisted all efforts to get her off. Her officers and men, with the exception of Lieutenant C. G. Hunter and a boat's crew, were obliged to surrender to the Mexicans. They were, however, subsequently exchanged.

In the autumn of 1846, the plan of a campaign was mapped out which contemplated the reduction of the city of Vera Cruz and its famous castle, and thence the marching of a large army by the shortest route to the capital of Mexico. It was highly advisable to conceal this plan from the Mexican Government. In order, therefore, to divert attention from the real point of attack, and to provide a convenient place for concentrating troops, orders were sent in October to Commodore Conner to take possession of Tampico. The *Raritan*, *Potomac* and *St. Mary's* were directed to rendezvous off that port. On the 12th of November, the steamer *Mississippi*, having on board a detachment of 100 marines and seamen from the *Cumberland*, and towing the *Vixen*, *Nonata*, *Bonita* and *Reefer*, and the steamer *Princeton*, having in tow the *Spitfire* and *Petrel*, left the anchorage of Anton Lizardo. Arrived off the bar of Tampico, on the morning of the 14th, 300 men were placed in the boats of the various vessels, which, in connection with the schooners above mentioned, in tow of the steamers *Spitfire* and *Vixen*, were carried safely over the bar and passed up the river. The defences of the city had been abandoned, so that no resistance was met with. Before reaching the city, a deputation from the government came on board, with whom the terms of a peaceable surrender were arranged. Two merchant vessels and three gunboats were taken in the harbor. A strict blockade of the port continued to be maintained after its capture, and it was also garrisoned for some time by a strong detachment of troops.

From Tampico an expedition was sent under Commander Tattnall, with the steamer *Spitfire* and the schooner *Petrel*, to Panuco, situated about 80 miles up the river of the same name, for the purpose of destroying some cannon and other munitions of war which the Mexicans had conveyed from Tampico prior to its surrender. Though the river banks afforded many points from which artillery might have swept the decks of the vessels, the

enemy offered no opposition, and on the 19th of November, the town was taken possession of and the military stores destroyed or brought away. In the latter part of November, the frigate *Cumberland* was sent home for repairs, Captain Forrest transferring his command to the *Raritan,* while Captain Gregory and his crew went home in the *Cumberland.*

While the squadron was off Tampico, the brig *Somers* maintained the blockade at Vera Cruz. The barque *Creole,* conveying munitions of war to the Mexicans, had violated the blockade, and lay on the night of the 20th of November in supposed security under the guns of the fortress San Juan de Ulloa. In the darkness, a boat from the *Somers,* containing Lieutenant James L. Parker, Passed Midshipmen R. C. Rogers and J. R. Hynson, and five seamen, quietly approached the barque. The guard was surprised, captured and afterward set on shore, while the vessel was set on fire and burned. The adventurous and gallant party escaped without injury.

On the 5th of December, Passed Midshipman Rogers and Assistant Surgeon J. H. Wright, of the *Somers,* with one of the crew, went on shore in the vicinity of Vera Cruz for the purpose of making a reconnaissance. They were soon surprised by a party of Mexicans. Dr. Wright managed to escape, but the other two were taken prisoners. And although Midshipman Rogers wore his uniform, and could properly be deemed only a prisoner of war, his fate was for a long time doubtful, the Mexican authorities seeking to convict him as a spy. He endured great hardships, and was finally taken to the City of Mexico, whence he escaped before that city was captured by the American arms. He subsequently joined the army of General Scott and served with distinction in the brilliant battles which closed the war. His misfortune in being captured probably saved him from the more melancholy fate of most of his companions on board the *Somers.*

The *Somers,* on December 8, while seeking, under a press of canvas, to cut off a vessel which was making for the harbor of Vera Cruz, was struck by a " norther " and thrown on her beam-ends. She went down very soon, carrying with her Acting Master H. A. Clemson, Passed Midshipman Hynson,[1] and nearly half

[1] In the grounds of the United States Naval Academy at Annapolis, Maryland, stands a simple marble monument, which bears the two inscriptions:

her crew of 80 men. The *John Adams,* which was just then coming down the coast, went to the assistance of the brig, as did also the boats of the British, French and Spanish ships of war anchored near. By these, some of the officers and men were rescued, while others succeeded in reaching the shore, where they were made prisoners. Gold and silver medals were subsequently presented, by order of Congress, to the officers and men of the foreign vessels who had so nobly and generously risked their own lives to save some of their fellow men from the wreck of the unfortunate *Somers.*

On the 20th of December, Commodore Perry, with the *Mississippi, Vixen, Bonita* and *Petrel,* arrived off the town of Laguna, in the province of Yucatan. Leaving the *Mississippi* off the bar, he took the schooners and barges in tow of the *Vixen,* and proceeded up to the town. Possession was taken without difficulty, and the military stores were seized. Two forts were occupied, the American flag hoisted upon them, and the guns and carriages destroyed. Commander J. R. Sands, with the *Vixen* and *Petrel,* was left in charge of the place. And on returning along the coast, Lieut. Commandant T. G. Benham, in the *Bonita,* was left at Tabasco River to assume the command of the blockading vessels at that point.

The year 1847 opened with very extensive and active preparations for the contemplated attack on Vera Cruz and the castle of San Juan de Ulloa. The descent of so large a body of troops as was necessary for the grand plan of this campaign upon an open coast, with the needful but heavy encumbrance of its military supplies, was no light work; and the aid of the navy was, in all the phases of the undertaking, indispensable. Great activity consequently pervaded this branch of the service. Bomb-ketches and steamers were purchased, equipped, and sent to the Gulf. The ship-of-the-line *Ohio,* which was preparing for the Pacific, and the sloops *Germantown, Saratoga* and *Decatur,* were rapidly fitted out and ordered to join the squadron. There was soon

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"To Passed Midshipmen Henry A. Clemson and John R. Hynson, Lost with the U. S. Brig Somers off Vera Cruz, December 8, 1846. This monument is erected by the Passed and other Midshipmen of the United States Navy as a token of respect."

and

"To Midshipmen J. W. Pillsbury and T. B. Shubrick, killed near Vera Cruz in the discharge of their duties."

assembled on the east coast of Mexico, around Vera Cruz as a center, or scattered at various ports on blockade duty, probably the largest force up to that time under the command of a single American naval officer.

The transports, conveying troops and supplies, were directed to rendezvous at the island of Lobos, which lies about 12 miles off the coast, and some 60 miles below Tampico. At this point many of them assembled during the month of February; and, as the season was advancing, the commander-in-chief decided to effect an immediate landing, notwithstanding the fact that many very necessary supplies had not yet arrived. Surf-boats suitable for landing purposes had been contracted for in the different ports of the United States by the quartermaster's department of the army. These boats were built with both ends alike, so as to steer with an oar at each end, and to stow in nests of three each, the largest one measuring 40 feet in length. One hundred and forty-one boats were contracted for and built. Out of this number, however, only 65 had reached headquarters by the time they were required for the landing of the troops.

The army sailed from the rendezvous at Lobos Island on the 5th of March. In anticipation of the arrival of the transports off Vera Cruz, the frigate *Potomac* and the sloops-of-war *Albany* and *John Adams* were stationed in the vicinity of Isla Verde (about five miles to seaward of the city), with orders to put an officer on board each vessel as she arrived, to pilot her into the anchorage at Anton Lizardo; or, should the number of officers prove inadequate for this duty, to furnish the masters of the transports with such sailing directions as would enable them to pass inside of the Blanquilla Reefs to the anchorage. The naval squadron, under the command of Commodore Conner, and the transports, having on board the troops and their equipment, under the command of Major General Scott, were thus concentrated at the anchorage between the island of Salmadina and Point Anton Lizardo, a distance of about 10 or 12 miles to the eastward of Vera Cruz.

As fast as those transports having on board any of the surf-boats arrived, the boats were launched under the direction of a lieutenant of the squadron, their equipment inspected, and everything belonging to them fully prepared for service, after which they were hauled up on the landward side of the island, and

arranged and numbered in divisions, each division consisting of 10 boats, taken from all the different sizes.

In the meantime, a speedy debarkation was decided upon. Accordingly, the general-in-chief and the commodore of the squadron made a joint reconnaissance in the steamer *Petrita*, with a view to selecting the most advantageous point for that purpose. The beach near Sacrificios was deemed the most eligible point, and the debarkation was appointed to take place on the 8th of March. The surf-boats were apportioned for use among the men-of-war, and Captain Forrest, commanding the frigate *Raritan*, was ordered to superintend the whole operation. All the preliminary arrangements were completed on the evening of the 7th, but the next morning there were indications of a "norther," and the movement was postponed. At sunrise on the morning of the 9th, the officers and men detailed for that duty were sent from the men-of-war to launch and man the surf-boats. Those divisions of boats manned by the *Raritan* and *Princeton* were assigned to the transfer of the first line; and in like manner those divisions manned by the *Potomac* were assigned to the transfer of the second line, and those by the *Albany* and *St. Mary's* to the reserve. Each of the frigates received on board between 2500 and 2800 men, together with their arms and accoutrements. The sloops received about 900 each, and the smaller vessels numbers in proportion.

When all were transferred, the 15 boats belonging to the *Raritan* were taken to the steamer *Spitfire* to be towed to Sacrificios. The steamer *Vixen* went alongside the *Potomac* and took in tow the 20 boats belonging to her, the *Albany* sent her 10 to the steamer *Eudora*, the *St. Mary's* 10 were sent to the steamer *Petrita*, and the *Princeton* took in tow her own 10. At the same time, the vessels so sending them detailed two lieutenants and two midshipmen to remain on board the towing steamers and look out for their boats, together with two seamen for each boat, who were to remain in them and steer them during the tow. This part of the movement was completed very successfully about 10 o'clock a. m.; and a few moments afterwards, the squadron and such of the transports as had been selected for the purpose, got underway for Sacrificios, the general-in-chief on board the steamer *Massachusetts*, and the commodore in the *Raritan*.

The passage to Sacrificios took between two and three hours. Each vessel came in and anchored in the small space previously allotted to her without the slightest disorder or confusion, the anchorage being still very much crowded, notwithstanding the number of transports that had been left behind. The debarkation began on the instant. Each vessel, reclaiming her surf-boats from the steamer which had towed them up, sent them to receive the first line. The *Princeton* was ordered to take a position abreast the landing-place and as near the shore as possible; and the surf-boats were directed, after receiving their quota of soldiers, to rendezvous astern of her, and to form there in a double line ahead, according to regiments and companies, and in prescribed order of battle, the two head boats holding on to each quarter of the *Princeton*, the next two holding on to them, and so on, with the regimental flag flying in the head boat of each regiment.

While this work of transfer and arrangement was going on, the steamers *Spitfire* and *Vixen*, and the five gunboats *Petrel, Bonita, Reefer, Falcon* and *Tampico* were ordered to anchor in a line parallel with and as close in to the beach as they could get, to cover the landing with their guns, if necessary. These vessels were armed chiefly with 32-pounder shell guns and were of such light draft (from five to eight feet) that they were able to take positions within good grape-shot range of the shore.

When everything was ready, the boats cast off from the *Princeton* and from each other, squared away in line abreast, and pulled in together to the beach, where the troops landed without the slightest opposition. The boats immediately returned to the vessels for the second line of the army, and then for the reserve; and without waiting to form again in order of battle, they continued to land the troops upon the beach, in successive trips, as fast as they could come and go. At some places, the loaded boats grounded on the bar some 20 yards from dry land, and the troops had to wade waist-deep through the water to get ashore. This occurred in comparatively few instances, however; and aside from the inconvenience of these few wettings, not an accident of any kind occurred throughout the whole operation. No enemy appeared to dispute the ground; and General Worth had the satisfaction of forming his command on the neighboring sandhills just before sunset. The landing had begun about the middle of the after-

noon, and before 10 o'clock that night upwards of 10,000 men, with stores and provisions for several days, were safely deposited on the beach.

The steamer *New Orleans*, with the Louisiana regiment of volunteers, arrived at Anton Lizardo just as the squadron had been put in motion for Sacrificios. She joined the other vessels, and her troops, together with the marines of the squadron, who formed a battalion under the command of Captain Alvin Edson, of the marine corps, were landed with the others. Other troop ships came in subsequently. On the 24th of March, the field return showed a total of 12,603 men. In the meantime, also, the transports were ordered up successively from Anton Lizardo; and whenever the weather would permit, the surf-boats, still manned and officered from the squadron, were constantly employed in landing artillery, horses, provisions and stores.

The perfect success of the entire operation is sufficiently evident from the foregoing, without further demonstration. It only remains to add a few words from the reports of the two commanding officers, expressive of their gratification. Commodore Conner said: "The officers and men under my command vied with each other, on that occasion, in a zealous and energetic performance of their duty. I cannot but express to the department the great satisfaction I have derived from witnessing their efforts to contribute all in their power to the success of their more fortunate brethren of the army." And General Scott wrote that: "To Commodore Conner and the officers and sailors of his command, the army is indebted for great and unceasing assistance, promptly and cheerfully rendered. Their co-operation is the constant theme of our gratitude and admiration."[2]

Pending the bombardment of Vera Cruz, Commodore Conner, who had now been in command of the Home Squadron more than three years, and whose health had become seriously impaired,

[2] The above account of the debarkation of the army of Major General Scott at Vera Cruz is derived mainly from the memoir of Passed Midshipman William G. Temple, who, about the year 1851-1852, with the sanction of the Secretary of the Navy, prepared it from original sources and placed it among the archives of the Navy Department with a view to preserving to the service a record of the transaction which it describes. It was incorporated in Cooper's "History of the Navy," edition of 1856, and 40 years later printed in full in P. S. P. Conner's "The Home Squadron under Commodore Conner in the War with Mexico."

was relieved, on the 21st of March, by Commodore M. C. Perry, and returned home in the *Princeton*. On the 22d, the investment of the city was completed and some of the batteries constructed, whereupon the governor was called upon to surrender. This being declined, in the afternoon of that day the firing was begun from the trenches, and was returned from both the city and the castle. At the same time, the two small steamers *Spitfire* and *Vixen* and five gunboats, led by Commander Tattnall, took a position near the shore, from which their heavy shot could reach the city. Their position was gallantly maintained and the fire kept up with rapidity and steadiness until late in the evening. They were supplied with ammunition during the night, and on the morning of the 24th moved to a still nearer and more favorable position, whence the firing was resumed. It soon became apparent, however, that the flotilla was in a position inconsistent with its safety, and it was therefore recalled.

It being the earnest desire of the officers and men of the navy to take some active part in the siege, General Scott generously assigned them a place in the trenches. Three 8-inch Paixhan guns and three long 32-pounders were landed from the squadron; and after vast labor in dragging them through the sand, in which duty the sailors were aided by detachments from the army, the guns were mounted in battery, under the superintendence of Commander A. S. Mackenzie. This battery was served by different detachments from the various vessels, composed of lieutenants and other officers, with an adequate number of seamen, all under the command of a captain. Each detachment was on duty 24 hours.

The battery opened its fire on the 24th under charge of Captain John H. Aulick, of the *Potomac*. As soon as discovered, it drew upon itself an exceedingly severe fire from the enemy's guns, which was returned deliberately and with marked effect for about four hours, when the supply of ammunition failed. The loss in this detachment was five seamen killed and one officer and four men wounded. The relief party arrived in the afternoon under the command of Captain Isaac Mayo, of the *Mississippi*. The breastworks being much shattered, the night was spent in repairing them. Early on the morning of the 25th, the fire of four of the Mexican batteries was concentrated upon this work. An active cannonade was kept up in return until half-past two in the

afternoon, when the enemy's guns were silenced. Two other batteries then directed their fire upon our naval battery, but they also were soon rendered ineffective. During this day, Midshipman T. B. Shubrick, while pointing a gun, was killed. One seaman was killed, and three were slightly wounded. Captain Mayo was relieved toward the close of the day by Captain S. L. Breese, of the *Albany;* and the cannonade of the day gave employment for the night in restoring the dilapidated defences.

In the morning, a storm so filled the air with dust, that it was impossible to sight the guns, and soon an order arrived from the commander-in-chief that the firing need not be resumed, as negotiations for a surrender were in progress. In the commission for the settlement of the terms of capitulation, Captain Aulick represented the navy. On the 29th of March, the combined forces of the army and navy took possession of the city and castle, while the American flag was hoisted over both amid a grand salute from the squadron and the batteries. During the siege, the naval battery threw 1000 Paixhan shells and 800 round shot into the enemy's walls and forts.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

NAVAL MEN AND THEIR MANAGEMENT

By LIEUTENANT (JUNIOR GRADE) V. N. BIEG, U. S. Navy

The art of handling men is unfortunately too often regarded as a gift and not the result of study and development. This is far from true.

Many things about handling men can be learned from observation of experienced officers and their methods; of those apparently making good in this line; by one's own experiences; by an analysis of emotions created in one's self by various treatments of superiors; by the perusal of War College pamphlets dealing with command; by a study of the psychology of mobs; by reading articles on the subject of which this humble treatise pretends to be one, and, lest we in our masculine conceit forget it, not a few things can be learned from women.

The ability to handle men is manifestly one of the most vital qualifications of any leader, and therefore, for all naval officers a study of and constant attention to this subject is paramount to a successful fulfilment of duty. For when an officer must perform work through the medium of others, and it is evident that this is often the case, of what avail is the most thorough technical knowledge if the medium or personnel through which this knowledge must be applied be not properly and efficiently handled. This condition would seem to be analogous to the case of a man who has spent his years developing a high intellectuality but who is totally devoid of character, his intelligence only enhancing his power for evil.

Whereas in the handling of material perfection is gained by the expenditure of money, and damage done through mistake is readily made good; perfection in the handling of men got through practice must be acquired at the expense of considerable unhappiness and inefficiency with its further concomitant injurious results

to material, and damage done is not only difficult to repair but is lasting and spreading in its results.

It is assumed that the end to be obtained by efficient management of men in the service is, the attainment of the highest degree of military character, the production of the greatest amount of useful work and the smoothest running and most economical organization. These being the conditions best for the service then surely every legitimate means should be employed to establish them.

Military character so differs from that developed by the ordinary circumstances of life that but few if any men without long service have a correct conception of it, nor can many meet its stringent requirements after many months in the navy. The fact that our term of enlistment is only four years, a great drawback, and that old and experienced men are forever leaving and new and inexperienced men arriving, it should be taken into consideration that a successful development of military character must be made the result of intensive instruction and not, as is too often the case, the consequence of only partly merited reproof, drawn on self through ignorance.

Work, it has been said by Lieutenant Vanderdecken, R. N., in his "Modern Officer of the Watch," is performed by men for two reasons; the hope of reward and the fear of punishment, the former being the stronger reason. There are others; the instinct to follow a good example, which is, according to Professor Münsterberg, psychologically stronger aboard ship than in any other place, where the accomplishment of the same end is a strong bond of sympathy binding all together; and the stimulus of competition which peculiarly appeals to the American in whose breast there is ever a strong desire to beat the other fellow.

A military unit being an aggregation of individuals, their handling in detail must of necessity be a collection of individual cases; and a leader must know the peculiarities of his men, their weaknesses, their characters, abilities, etc. Likewise he must know himself.

A wise saw might be corrupted and written, "Know thyself first and then thy men."

The man of first importance in any military organization is the leader. According to rules here set down, in part at least, he must govern and restrain himself perhaps to a greater extent than

the men under his charge in order to conduct properly the affairs of his unit.

It is the duty of the commander to bear ever in mind the happiness, comfort and welfare of his men. When they realize that this is done for them, their response to any call will be free and whole hearted. Special privileges, special money grants, liberty and innumerable things, little in themselves, can be done for men as a reward for certain work and the attainment of certain standards on their part. Rewards, like punishments, should be specified definitely so that work well done is certain to be followed by fixed results, not sometimes or probably but always. As has been practically demonstrated the response to such treatment is marvelous.

For happiness it is necessary that some at least of a man's desires be gratified. The more that are gratified within rational limits the happier he must be.

The Navy Regulations state very clearly what should be the attitude of the superior to his subordinates. He must show in himself a good example of virtue, honor, patriotism, subordination, zeal, etc.; he must be neat in his appearance, courteous in his manner, firm but not harsh; he must be cool and ever keep his temper. It is to be expected that his men will follow his example if good, and unfortunately too if bad. His treatment of superiors will be reflected in the manner in which he is treated by his own juniors.

Criticism of superiors, even when all the facts of a case are known—a condition seldom realized—is injurious, and is inevitably spread, especially by mess boys, thus weakening confidence, and is moreover unwarranted in our service, containing as it does many of the finest brains of the nation.

The leader must lead. He must be first in all things pertaining to the duties of his command.

Encourage initiative in subordinates, but never allow it to develop into wilfulness.

Do not shout, it serves to create excitement and lessens dignity.

Remember that familiarity breeds contempt, be it with danger or men.

When calling a man down never lessen his self respect, his spirit may be broken beyond repair.

Never let personal likes and dislikes influence you in "Balling men out," or in the matter of awarding punishments.

Playing the popularity game is not only at the expense of discipline, but at the most is unremunerative.

Favoritism is manifestly entirely bad, and is generally unappreciated by those favored.

Whatever a man's occupation he is a man for all that and should be treated as such. He has rights even as you or your civilian brothers.

Never swear at a man. It is unnecessary, and an undeserving miscreant may be exalted to the state of receiving an apology.

Do not be squeamish. Seamen as a body have not been reared on subtleties.

To find fault with a man doing his best is only to discourage him utterly.

Be explicit in giving orders and then see that they are carried out to the letter. When not properly carried out examine first yourself to see if the fault lies in your not having heeded this precaution.

It is incumbent upon an officer to know every possible method of rewarding good services; such, for example, as: Advancement in rating; medals; prize money; special privileges, as excusing from every other bag inspection any man who keeps an habitually neat and clean bag; detailing to jobs where extra pay is drawn; advancement in liberty classes; verbal praise, though this should be given with reserve or swell head will result; etc.

Likewise should he know and have at his fingers' ends a multitude of appropriate punishments, so that all men may feel that breach of regulations will be dealt with summarily and without delay, for punishment held in abeyance loses half its effect. It would be well to say here that, as attested to by an eminent criminologist, it is the certainty of and not the degree of punishment which deters the misdoer.

It is not always necessary or advisable to take a man to the mast or report him, indeed it would be better if this could altogether be avoided. Punishment of serious offences is of course, and rightly, left either in the hands of the captain or a court-martial. For minor offences, however, the following usually suffice and are not only effective but are preferable from both the point of view of men and officers: Small extra jobs; extra sea watches; toeing a line; scrubbing division bag and hammock bags: detailing to dirty jobs where there is a preference; scrub-

bing clothes out of hours; threat of disrate; lowering a conduct class; call down; threat of low efficiency marks; etc.

One of the most important duties of a leader is the matter of instruction, for how can the raw recruit be expected to arrive at a satisfactory state of erudition without it? Can it be reckoned for an instant that farmers' sons can don a uniform and become overnight well versed in the ways and laws of seamen without advice? Yet this is often supposed to be the case, and men are punished for misconduct when only vaguely meriting it. Instruction in even the most homely subjects and in proper methods of behavior is necessary, if not to all then at least to so many that all should be included. Every drill and every action done should, where possible, be preceded by instruction. Usually success will attend. If failure results through no intended inefficiency then encouragement should follow, if through negligence or inattention to instructions then punishment should follow.

Also at frequent intervals men should be reminded of the effects of different breaches of regulations so that they may ever be in mind, for misdeeds which grant immediate pleasures and results are more impressive on an undisciplined mind than are the relatively distant evil effects attendant. If men can be made to realize to what misconduct will surely lead, and the records of our courts-martial show that many do not know, then not a few of the cases now brought before the mast might be avoided.

When an officer examines into an alleged offence he should question first the prosecutor, or man making the report, afterwards the defendant, giving no undue credence to the story of either until all facts are brought out.

Before bringing a case to the mast it should be investigated thoroughly, going into all details of procurable evidence, and taking the names of all witnesses. If convinced that there is a good case and a definite one against the wrongdoer and only then, report him. Often where this is not done the reputation of a good man is unfairly impaired for there ever remains a suspicion of the acquitted innocent. Furthermore, to bring a man to the mast only to have him dismissed without punishment is to lower the prestige and corrective influence of that venerable institution.

In connection with offences committed against shore-patrols and beach-guards, every effort should be made at the time the offence is committed to obtain witnesses and the corroboration of facts.

In a deck division or other unit of ship organization to which this article particularly applies, there will be encountered numerous types of men, which once learned will be found, figuratively speaking, almost as unvarying as standard fittings. They can be classified and dealt with accordingly, each individual in a class being efficiently handled by the application of the same treatment.

Officers assuming command over new bodies of men should not wait for the various types of men to manifest themselves but should from the very first endeavor by means of their records, their petty officers, and any other sources of information, to size them up, getting as it were the jump on them.

If the tenets of this article are followed men should be assigned to the various classes considered later, and men newly coming into the service or changing command should be instructed into what classes naval characters are grouped, in order that a man may from the outset choose from among them, and choosing other than those commendable, may have none other than himself to blame when just punishment is meted out to him.

It is best for an officer never to rely solely on his own judgment when assigning men to classes, for men might behave well toward some officers and execrably toward others. Those who come daily into contact with them should be consulted. For instance, when getting an estimate of a deck petty officer, consult first lieutenant, boatswain, officers of the deck and chief petty officers.

Having dealt with discipline that a leader must exact from himself let us consider what is to be expected from the men under his control.

The writer has classed them as good, indifferent and bad.

CLASS 1.—Under this heading comes the all around good man, steady, reliable, respectful, willing and bright, and he should be rewarded for his efforts.

As much, however, as it is desired to reward deserving men it should never be held out as an inducement unless it is certain upon a man's doing his part that his hope may be fulfilled. Otherwise disappointment with its accompanying sourness of mind is apt to start a good man on the downward path.

Petty Officers.—More strongly every day is it becoming apparent that as ships and their crews increase in size, petty officers must be more and more relied upon. A very high standard of efficiency ought to be expected and relentlessly exacted

from them. They and their subordinates, at every turn, should be made to realize their importance and prestige. Petty officers should be made to handle all details and should be given more freedom than they are at present allowed, they absolutely must be backed up and given sufficient authority over their men commensurate with their responsibility. For example, when a petty officer is standing near when a man makes a mistake, an officer instead of telling the man direct wherein his fault lies, as is so universally done, the petty officer should be made to instruct the man. Moreover, unless this soon becomes a habit on the part of the petty officer, without coaching, he should be reprimanded severely. In no other way can it be expected, when officers' backs are turned, that discipline will be carried on by the petty officers who are as responsible for its maintenance as are the officers.

Any tendency on the part of high petty officers to fraternize with the men on shore or aboard should be rigorously checked.

CLASS 2.—Under this heading we have those men who are indifferent and not over ambitious, who work when watched or for fear of punishment and others characterized as indifferently good.

These men should be made by every endeavor to realize the advantages the navy and hard work offers them, and their pride, their self respect and even their patriotism appealed to. Competition will often stir them from their reluctant apathy. They must be made to realize that in the long run the harder they work the less they will have to do and also if they persist in their listless, no account attitude toward their duties and themselves, that not only can they never succeed, but their work will be made harder and harder for them. If this appeal to their sense of decency does not awaken a sincere response then they must be driven and every failure to properly carry out certain duties, which should be made specific, must be followed by the compulsory performance of that same task plus a little more. By repeated offences men will accumulate an amount of work, the performance of which must finally impress lastingly that the straight and narrow path is the best. If this fails then ordinary privileges allowed good men should be withheld and be given only as compensation for work and service done. In other words, indolence must be purchased at a prohibitive price. Horses buck but not for long.

Passive Petty Officers.—Unfortunately in our service there are to-day any number totally devoid of the initiative and corrective ability which makes good leading men, particularly among the lower ratings. A great deal has recently been written and said on the subject. A petty officer who stands and complacently watches an inferior commit a breach of discipline or make an error without endeavoring to correct the same on the spot, too often with a smile disfiguring his countenance, is far worse than the man he watches, and any petty officer who is not actively assertive for good ought not to be tolerated for an instant. He should be warned once upon the assumption that he is ignorant of the vital importance of his office. It must be impressed upon him that he has been chosen from and put over the many because of special ability, and that only when he makes others rise to his standard is he performing his duty; furthermore, that he is not essential to the welfare of his unit unless he is willing to grasp this fact. There are many men anxious to wear his shoes, and if in his division there is no immediate junior to pick, there are on a ship or at a yard or other station hundreds who wish to succeed him.

On the job or off comes his buzzard.

Old-timers.—Old-timers are usually very valuable men, and by including mention of them in this class it is not intended to belittle their worth in the least. They are considered here only in the case of the old-timer who frequently is quite annoying by displaying an attitude of knowing it all, backed by the indisputable authority of a hash mark and showing a decided disinclination to do anything in a different manner from that employed on the last ship he was on. The treatment of his case is obvious.

The Privileged Character.—Enlisted men as a class seem unable to stand prosperity, and upon advancement a good man often spoils his position by encroaching upon the good nature of those who have recently made him. Being a condition to be expected it should be if possible anticipated, or if not then, upon its first appearance gently but firmly nipped in the bud.

Drunkards.—The Navy Department has recently issued a general order dealing quite effectively with offenders of this nature.

Never argue with a drunken man, disrespect is sure to crop out, which hurts not only your own prestige but unnecessarily implicates the man.

It is never wise to trust solely to your own judgment as to whether a man is drunk or not. In order to safeguard a man's health in case of drug poisoning and because a court-martial might want the evidence of a surgeon in this matter, he should be examined by a doctor whenever in bad condition.

Men Habitually Dirty.—In a certain officer's organization those men habitually unclean were made to fall in at formations apart from the other men. The reason for this was made painfully plain to them. When their self respect had brought them around to a proper state of shinyness they were asked their name in front of their division. They were told that they were not recognized because they now presented such a neat appearance and were such fine looking fellows, whereas men who had been there before by that name were always dirty. They were then sent back to ranks. In this way their " brace up " was recognized and praised, and one such dose was found an efficient cure.

Another very persuasive argument is to have the offender bring his bag and hammock for inspection every day for a week or two. This soon becomes a wearisome pastime, more so than scrubbing a few clothes and washing.

Also compulsory scrubbing of clothes out of hours becomes by reason of its irksomeness quite convincing.

By these means an unclean, dirty lad is brightened up into a neat, self-respecting and inwardly grateful man.

Members of Cliques.—But seldom are cliques formed among seamen for the furtherance of good. More often does a coalition of this sort stimulate its members to mischief, if not to actual bad. Cliques should be disbanded in their incipiency by a word to the wise, or soon there will appear a case more grave and difficult of solution. These men should be cautioned whither they are steering and consulted separately, as an interview with the whole is apt to cement their alliance by a common bond of sympathy.

CLASS 3.—Men totally bad.

The Malingerer.—This is a common type, and when unmistakably recognized or justly suspected should be reported, that the ship's doctor may be forewarned. An habitual malingerer should, before consideration is shown his ailments, be made to present a certificate from the doctor to the effect that his pains are real. Great discretion must however be observed in the hand-

ling of these men, for once out of many times he may really be sick. And herein lies the contemptible power of this species.

Agitators and Sulkers.—Men of this type are extremely difficult to handle. Your true agitator is imbued with the socialistic idea, feels the burden of the troubles of the whole of sailordom upon his shoulders and has a good word for none in authority. They are in his eyes only fit objects for scorn and criticism. The difficulty in handling these men is that they think that they are the champions of a good cause, and are not able clearly to see themselves in the wrong because of the blinding fallacies of their belief.

If sulkiness or agitating assume so marked a character that a definite offence is committed against discipline then it can be readily reported and squelched. But more often it assumes that evasive form, so irritating, upon which one cannot put his finger.

It would seem of importance to the service to nurse this type a bit in an effort to show these individuals the error of their ways and make better men out of them. Failing this, punishment generally makes their tendency stronger and finally they leave the service to bear disgruntled, garbled, fanciful, exaggerated stories of the navy to their colleagues the socialists, who are only too ready to receive them with open arms.

Fresh or Insolent Men.—Men of this persuasion vary all the way from those who only intend to be funny to those characters who are willing, apparently, from insanity or lack of manners, to go to any extreme, to undergo any punishment, to be insulting, insolent and disrespectful. Any noted tendency in this direction should be checked at the very outset. Such men must be irretrievably broken. To wait for an accumulation of offences before putting a stop to this sort of thing is not only to lessen the dignity of authority but to encourage the perpetrator.

When talking to or questioning these men phrase language in such manner that there is no possibility of facetious answer, especially in the presence of a third party.

The Out and Out Crook.—There is one peculiarity about crooks in the navy. The majority of them are to be found among the young men and more especially among those who have been only a short time in the service. They must be hunted down with unrelenting vigor, for aboard ship amid the crowded and cramped life there is no other place where crime produces more irritating

and unpleasant consequences. These cases of course should be handled at the mast.

Theft, for example, can thoroughly annoy and upset a whole crew, for men aboard ship are particularly helpless as regards safe keeping of clothes and personal effects, and only one theft will start the most unpleasant suspicions and accusations.

Even under these circumstances it seems hard to gain the co-operation of the men to catch offenders. No effort of officers, petty officers, masters-at-arms and others should be spared to bring the culprits to justice, and the right of search should be exercised to the full, inconveniencing the few for the good of the many.

It may be assumed for the sake of being on the safe side that men will do wrong unless told to do right.

One not familiar with the naval service and existing conditions therein would be led by a perusal of this article to suppose that daily work is carried on to the lash of knouts and the domineering surveillance of heartless tyrants and indeed touched but lightly on any subject but punishment. It must be understood that this punishment is only for the control of those men, happily becoming fewer in the service, who form a small percentage of the units of organization, but who, by their unruly conduct, make it paramount to every officer to be conversant with sufficient methods of keeping them within legitimate limits. This is for the protection of the interests of willing men, about whom so little has been said, for the reason that they need no handling, no watching or punishment; for the exaction of that standard of service that men are paid to deliver from the taxes of the people; to make them perform the just duty to which they should cheerfully arise in the service of our country; and to make them better men and citizens.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE SHIPS OF THE UNITED STATES NAVY

AN HISTORICAL RECORD OF THOSE NOW IN SERVICE AND OF THEIR PREDECESSORS OF THE SAME NAME

1776–1915

By ROBERT W. NEESER

NEVADA

NEVADA.—One of the United States, in the southwest. It was acquired by treaty after the Mexican War, and admitted to the Union in 1864. The principal mountain range in the state is the Sierra Nevada (Snowy Range), so called by the Spaniards after the mountains of that name in Spain.

The *Nevada* is a battleship of the dreadnought class. She was launched last summer, July 11, 1914, at the yards of the Fore River Shipbuilding Company, Quincy, Mass., her keel having been laid on November 4, 1912. Her dimensions are: displacement, 27,500 tons; length, 583 feet; breadth, 95 feet; draft, 28 feet 5 inches. She is to be fitted with Curtis turbines, for which steam will be supplied by 12 Yarrow boilers, developing 26,500 I. H. P., which will be sufficient to drive the ship at a speed of 20.5 knots. The fuel used will be oil only, of which about 2000 tons will be carried. The armor defence of the *Nevada* will include a main armor belt 17½ feet wide and 13.5 inches thick. There are to be two protective decks, one of 1.5 to 2 inches in thickness, and the other of 3 inches. The barbettes are of 13-inch armor, the turret port-plates of 16 to 18 inches, and the side and rear turret-armor of 9 to 10 inches of steel. The one smoke-stack is also heavily armored.

The *Nevada* and her sister ship, the *Oklahoma,* are the first ships of our navy to have triple-gun turrets, an arrangement calling for new features in the construction of the gun-mounts. Of the ten 14-inch B. L. R's. carried by the *Nevada,* six are to be mounted two triple-gun turrets, while four are in double-gun

turrets. This will give a bow and stern fire of five guns each. In addition, the ship is to have a torpedo defence battery of twenty-two 5-inch 51-caliber rifles, and four 21-inch submerged torpedo-tubes.

The second *Nevada,* still in service as the *Tonopah,* is a single-turret monitor authorized by Congress on May 4, 1898, and launched on November 24, 1900. Her original name was the *Connecticut,* but this was changed in 1900 to *Nevada,* to be altered a third time to *Tonopah* on March 2, 1909. On account of the small appropriation made by Congress for each of the monitors authorized, their size had to be limited to 3200 tons displacement, and only one turret could be furnished to each vessel. The turret was so arranged, however, that, mounted in the forward part of the monitor, the two 12-inch rifles could be trained over an arc of 300° and fired in almost any direction except dead astern. The *Nevada* is not as efficient a vessel as she would have been had she had two turrets, but the Navy Department in her design provided for as powerful a vessel as possible with the money appropriated.

The general dimensions of the *Nevada* are: length, 252 feet; breadth, 50 feet; draft, 12 feet 6 inches. Her engines are of the vertical triple-expansion type, of 2400 H. P. She has Niclausse boilers, a normal coal supply of 338 tons, and on her acceptance trial she steamed 13.03 knots. Her complement is 13 officers and 209 men. In 1903, her armament consisted of two 12-inch B. L. R.'s, four 4-inch R. F.'s, three 6-pounders, six 1-pounders, and two .30-cal. automatics. The secondary battery is carried in the superstructure which extends from the turret nearly to the stern. The changes in the battery, since the *Nevada's* first commission, have been as follows: in 1905, two 1-pounders were removed; in 1907, four 1-pounders were added.

During her first cruise, the *Nevada* was assigned for duty with the coast squadron. Her first commanding officer was Commander T. B. Howard (March 5, 1903), and under him the ship went into commission and sailed from Portsmouth, N. H., on April 18, 1903. On May 11, 1905, Commander Alfred Reynolds relieved Commander Howard. The *Nevada* and her sister ships in 1906 were transferred from the fleet to duty at the Naval Academy. During the next few years, then, the *Nevada* was

annually placed in commission early in June, and, at the expiration of the midshipmen's practice cruise, returned into reserve. Her commanders during this period were Commander Harry P. Huse (May 26, 1907) and Commander Harry M. Dombaugh (September 5, 1908). On March 2, 1909 the name of the *Nevada* was changed to *Tonopah*.

The first *Nevada* was a screw steamer built by the government in 1863 and launched on October 5, 1865, at the Philadelphia navy yard. She was a wooden vessel of the first rate, of 3850 tons displacement. Her length was 335 feet, her breadth, 44 feet 4 inches, and her draft, 11 feet 4 inches. She had two horizontal direct-acting engines of 48 inches stroke, and eight Martin boilers. The builders of her machinery were the Etna Iron Works of New York. The total cost of hull was $527,103.79, while the engines cost $680,000.

On September 1, 1864, the vessel was assigned the following armament, but the battery was never mounted: two 100-pounder Parrott rifles, one 60-pounder rifle, ten 8-inch smoothbores of 65 cwt., and four howitzers.

Previous to August 10, 1869, the *Nevada* was known as the *Arizona*, and from 1863 to May 15, 1869, her name was the *Neshaminy*. But, though the proud possessor of three different names, the *Nevada* had a singularly uneventful, if not disappointing, career. From 1866 to 1868 she was at the New York navy yard receiving her engines; in 1869 she was in ordinary at New York. Then the Goldsborough Board made an examination of her, and the following was their report: "Already, although never employed for a moment at sea, she exhibits a marked twist, or cant, of hull, and her original lines have doubtless become altered. It is very evident that in building this vessel sufficient means were not taken to secure enough strength, or else that it was impossible to secure enough, either in consequence of the materials used or owing to her form," which the officers characterized as "a sort of overgrown Indian canoe." "It would not be hazarding much to predict that she is already decayed in many places, besides being sorely twisted as stated above. This vessel, besides being built of white oak, is not even copper-fastened. She is fastened with treenails." So the *Nevada* remained in her incompleted condition, and five years later (June, 1874) was sold to J. Roach in part payment for the monitor *Puritan*.

OKLAHOMA

OKLAHOMA.—One of the United States. First discovered by the Spaniards in 1540, but later taken possession of by La Salle in the name of the King of France. It was acquired by the Louisiana Purchase in 1803, and in 1816 became part of the Indian reservations. In 1890 the Territory of Oklahoma was created. Seventeen years later it was merged with the Indian Territory and admitted into the Union, 1907, as the State of Oklahoma.

The *Oklahoma* is the first ship of the United States Navy to bear that name. She is a first-class battleship of the dreadnought type, and is at present under construction at the New York Shipbuilders Company's yards, at Camden, N. J., where she was launched on March 23, 1914, her keel having been laid on October 26, 1912. The *Oklahoma* is the first battleship launched for the navy which will burn oil exclusively, and she and her sister ship, the *Nevada*, are the first ships to have triple-gun turrets.

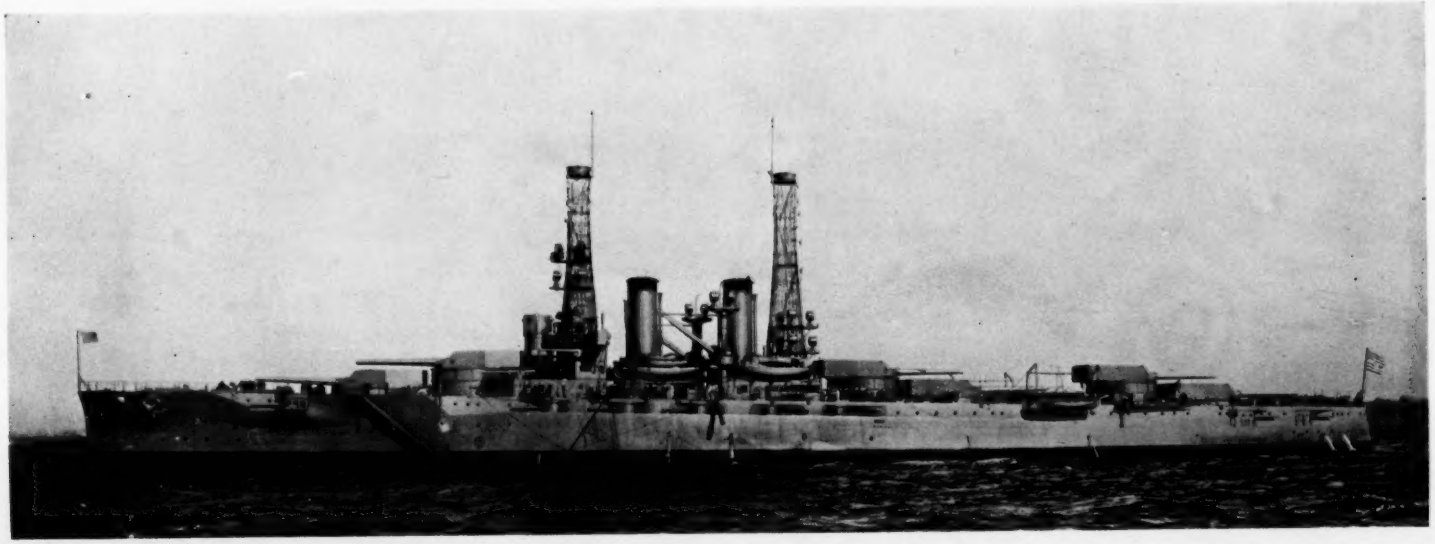
Her dimensions are: displacement, 27,500 tons; length, 583 feet; breadth, 95 feet; draft, 28 feet 5 inches; designed speed, 20.5 knots. She is to have triple-expansion engines driving twin-screws, and taking steam from 12 Babcock and Wilcox boilers. The total H. P. developed by her main engines is estimated at 24,800, and the weight of the propelling machinery will be about 1900 tons.

The battery of the *Oklahoma* will be disposed as follows: ten 14-inch B. L. R.'s will be mounted in two triple and two double turrets, while twenty-two 5-inch 51-caliber rifles will be mounted for torpedo defence on her gun deck and forward on the bridge. She will also have four submerged 21-inch torpedo-tubes. Her armor defence will include a main armor belt of 13.5 inches of Krupp steel (extending from 9 feet above to 8.5 feet below the water-line), and two protective decks, while 13-inch barbettes and heavily armored turrets will shield her main 14-inch armament.

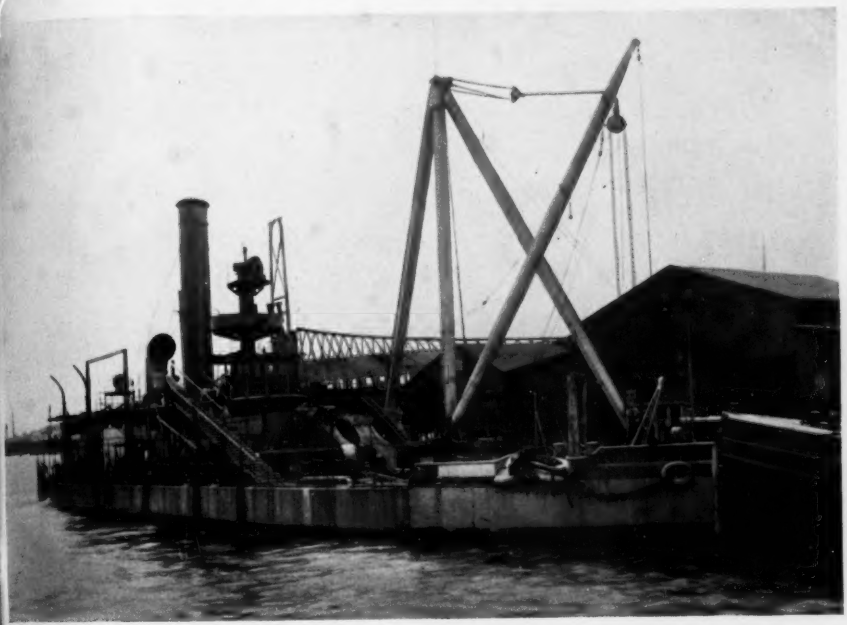
WYOMING

WYOMING.—One of the United States situated in the Rocky Mountain district. It formed part of the Louisiana Purchase, and was made a state in 1890. It derives its name from the Delaware Indian word *Maughwauwama*, signifying large plains. The Wyoming Valley is a beautiful and fertile tract on the Susquehanna River in Luzerne County, Pa.

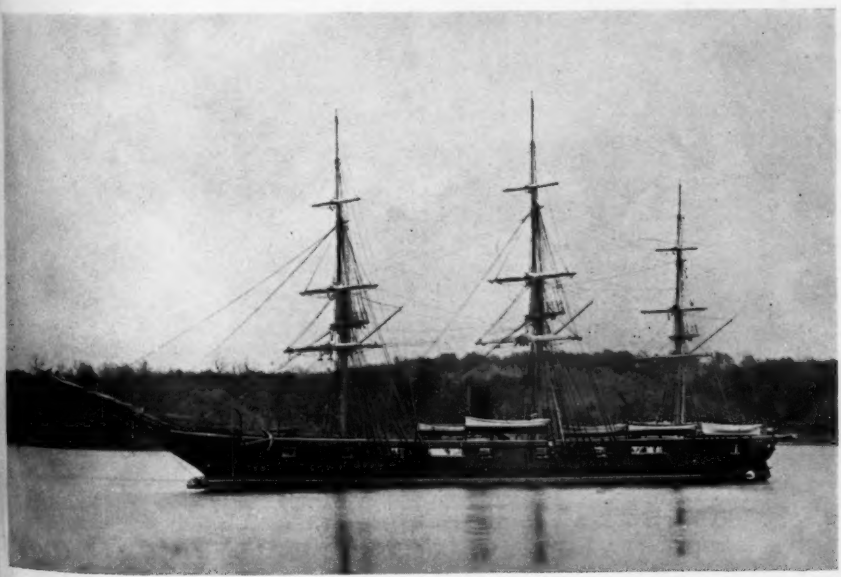
The battleship *Wyoming* is the third ship of the United States Navy to bear the name. She is an armored ship of the first rate,



U. S. S. "WYOMING"



Single Turret Monitor "Nevada"



U. S. S. "Wyoming"

of 26,000 tons displacement, authorized by Act of Congress approved March 3, 1909. Her builders were William Cramp & Sons, of Philadelphia, at whose yard she was launched on May 25, 1911, her keel having been laid on February 9, 1910. Her principal dimensions are: length, 554 feet; breadth, 93 feet 2½ inches; draft, 28 feet 6 inches. Her propelling machinery consists of Parsons turbines, driving four screws, for which steam is supplied from 12 Babcock and Wilcox boilers. Her trial speed was 21.22 knots. Her main armament consists of twelve 12-inch rifles mounted in turrets in pairs, while for torpedo defence she has twenty-one 5-inch R. F.'s placed in broadside. In addition she has four 3-pounder saluting guns, two 1-pounder boat guns, two 3-inch field guns and two .30-cal. machine guns. There are also two 21-inch submerged torpedo-tubes. Her complement is 1100 officers and men.

The *Wyoming* first went into commission on September 25, 1912, at the League Island navy yard, Pa., whence she sailed on October 6, under the command of Captain Frederick L. Chapin. After participating in the naval review at New York, she joined the Atlantic fleet as flagship of the commander-in-chief, Rear Admiral Charles J. Badger, on December 30, 1912. From this time she remained continuously with the fleet, visiting the Panama Canal in January, 1913, participating in the usual maneuvers and exercises, and then making the cruise to the Mediterranean in the autumn of that year.

Returning to New York on December 15, 1913, the ship had to bear the loss of her commanding officer, Captain Chapin, who died after a brief illness, on December 19. Captain James H. Glennon was thereupon ordered to the *Wyoming* (December 23), and under him the ship left the navy yard on January 6, 1914, flying the flag of the commander-in-chief until the end of March, when she returned to the New York yard for her first overhaul period since going into commission. But before the completion of her repairs, the *Wyoming* was again ordered to rejoin the fleet, then operating in Mexican waters, when she once more became the flagship of Admiral Badger.

This service the *Wyoming* performed at Vera Cruz until her return North at the end of the summer, when she steamed into her home yard proudly displaying the battle-efficiency pennant which had been awarded to her for the year 1913-14. After target

practice and an overhaul period, she went to sea under Captain Herbert O. Dunn, who had relieved Captain Glennon in command on January 6, 1915, flying the flag of Rear Admiral Frank F. Fletcher, the commander-in-chief. The winter was spent as usual in fleet exercises in Cuban waters. In the spring, the *Wyoming* came North for target practice and maneuvers, and for the naval review which, in May, was held on the Hudson River. On these occasions the *Wyoming*, as flagship of Admiral Fletcher, flew the four-starred admiral's flag of the commander-in-chief of the Atlantic fleet, which she hoisted off Cape Cruz, Cuba, on March 11, 1915, in accordance with the Act of Congress of March 3, 1915, reestablishing that rank afloat in our navy.

The second *Wyoming*, now known as the *Cheyenne*, is a single-turret coast defence monitor authorized by Congress on May 4, 1898, shortly after the outbreak of the Spanish-American war. She is a vessel of 3225 tons displacement, with the following dimensions; length, 252 feet; breadth, 50 feet; draft, 12 feet 6 inches. She was built at the Union Iron Works, San Francisco, Cal., and launched on September 8, 1900, 17 months after the laying of her keel. Her engines are of the triple-expansion type, and she has four Babcock and Wilcox boilers. Her speed on trial was 11.8 knots.

When she first went into commission, the *Wyoming* mounted two 12-inch B. L. R.'s, four 4-inch R. F.'s, three 6-pounders, six 1-pounders, and two Colt automatics. In 1905, this armament was increased by the addition of two 1-pounders. In 1903, the ship's complement was 13 officers and 158 men; to this number, in 1905, were added 51 men.

From Mare Island, Cal., the *Wyoming* sailed on her first cruise on December 8, 1902, in command of Commander V. L. Cottman. Six months later she joined the Pacific fleet. Returning to her home yard, Bremerton, Wash., on October 28, 1904, for repairs, she sailed again on January 26, 1905, under Commander J. E. Roller (January 20) for service with the fleet until July, when she was ordered to the Mare Island yard. Here she went out of commission on August 29, 1905, and remained thus until she was again put into service three years later (October 8, 1908) in charge of Commander John J. Knapp, which duty she was still performing on January 1, 1909, when her name was changed to *Cheyenne*.

The screw sloop *Wyoming* authorized by Congress on June 12, 1858, was named after the Wyoming Valley of the State of Pennsylvania. She was a wooden cruiser of the third rate. She was built at the Philadelphia navy yard at a cost of $323,537.40, and was launched on January 19, 1859, her keel having been laid in July, 1858. Her tonnage (old measurement) was 997 tons and her displacement 1457 tons, while her principal dimensions were: length, 198 feet 5 inches; breadth, 33 feet 2 inches; draft, 13 feet 3 inches. Steam was her principal motive power, and sails were auxiliary. Her machinery, which was constructed by Merrick & Sons, at Philadelphia, comprised two horizontal direct-acting engines of 30 inches stroke, and two Martin boilers, besides one auxiliary boiler. With her engines making 80 revolutions per minute, her speed was 10 knots.

In October, 1859, the *Wyoming* mounted two 11-inch smoothbores and four long 32-pounders. On April 1, 1864, one light 12-pounder was added to her battery. Then after the war (September 30, 1865) a 60-pounder Parrott was substituted for one of the 32-pounders. In May, 1871, the following armament was mounted: one 11-inch smoothbore, four 9-inch smoothbores, and two 20-pounder rifles. By July, 1871, another 11-inch gun was added; three months later a light 12-pounder was mounted; and in February, 1872, one 20-pounder was removed. Between 1877 and 1892, the various batteries carried by the *Wyoming* were: in January, 1877, two 11-inch smoothbores, four 8-inch guns, one light 12-pounder; October, 1878, two 8-inch muzzle-loading rifles, four 9-inch smoothbores, one 60-pounder rifle, one light 12-pounder, one 3-inch howitzer, and one gatling gun; in June, 1884, one 80-pounder B. L. R., eight 32-pounders of 45 cwt., one 8-inch M. L. R., and two 20-pounders. In November, 1884, one 60-pounder M. L. R. was added.

In October, 1859, the *Wyoming* sailed from Philadelphia for the Pacific Station to join the squadron under Flag Officer J. B. Montgomery. She was in command of Commander John K. Mitchell, and after an uneventful passage, she reached her station, where, in April she relieved the *Levant* on the coast of Nicaragua.

The outbreak of the Civil War found the *Wyoming* at San Francisco preparing for another cruise. But instead of proceeding to sea, Commander Mitchell was directed to remain off the Golden Gate in order to afford better protection to the United

States mail steamers on the coast. To the astonishment of the senior officer present Commander Mitchell failed to carry out these instructions. Once outside the harbor entrance the *Wyoming* was seen to steer a southerly course on which she continued until Panama was reached. In consequence of this flagrant disobedience of orders, Commander Mitchell was dismissed from the service and the *Wyoming* was placed temporarily in charge of her executive officer, Lieutenant F. K. Murray (July 4, 1861), who brought her back to San Francisco. This passage was full of mishaps; at La Paz the *Wyoming* grounded on coral rocks from which she was dragged only after three days and with the loss of her false keel, after which she ran short of coal and arrived at Monterey, Cal., on August 17 with her bunkers empty.

At San Francisco, Commander David McDougal assumed command of the *Wyoming*. The same day (August 9, 1861) the ship was ordered to proceed to the coast of Lower California where the American whaling interests needed protection against possible Confederate cruisers, and on the expiration of this service the *Wyoming* was transferred to South American waters, where she remained until the close of the year.

Returning to Mare Island, Cal., for repairs, Commander McDougal received orders on June 16, 1862, to proceed immediately to China in search of the "armed piratical cruisers fitted out by the rebels." So across the Pacific the *Wyoming* sped. But hardly was she in eastern waters than the *Alabama*, which had just entered the Strait of Sunda, learned of her presence from an English brig. Two days later Captain Semmes obtained similar information from a Dutch trader. Consequently the *Alabama*'s cruising ground was shifted to the China seas, and the *Wyoming* was left somewhere in the Strait, looking for her forewarned foe.

It was practically impossible for Commander McDougal to follow the movements of these elusive vessels. "It is now two months," reads his report dated October 22, 1863, at Anjer, Java, "since any reliable information has been received, which makes me think that instead of coming east they (the *Alabama*, the *Georgia* and the *Tuscaloosa*) have returned North, where they would have a more extended field for their operations than in these waters, as nearly all of the American vessels in the China seas have changed flags, otherwise get no employment. While

at Macao three fine American vessels were put under Portuguese colors, and since leaving that port I have seen but three American vessels, one at Batavia and two in the Strait of Sunda, one of which will change her flag on her arrival at Bangkok." Yet four days later the *Alabama* was off the Strait of Sunda and Captain Semmes was writing in his journal: "The *Wyoming* is a good match for this ship, I have resolved to give her battle. She is reported to be cruising under sail—probably with banked fires—and anchors, no doubt, under Krakatoa every night, and I hope to surprise her, the moon being near its full."

But while unsuccessful in running down the Confederate commerce destroyers, Commander McDougal was able to render important services elsewhere to his persecuted compatriots. It was about the middle of July, 1863, and the *Wyoming* was making preparations to carry out the Navy Department's orders of the 15th of April which directed her immediate return to Philadelphia, when news was received through Japanese sources that an American steamer had been fired upon by a bark and a brig of war belonging to the Prince of Nagato, at the western outlet of the Inland Sea, and that she had disappeared. A mail, on the same evening (July 10, 1863), brought authentic information that the American steamer *Pembroke,* on her passage to Shanghai through the Inland Sea, had been fired upon by the same vessels, and had made her escape through the Bungo Passage.

Without delay the *Wyoming* left Yokohama for the scene of the outrage. Three days later she arrived off the inner entrance of the western outlet of the Inland Sea. Immediately the presence of the American cruiser was announced by the firing of signal guns on shore, and the alarm was communicated along the batteries to the town of Shimonoseki, which lay concealed behind the promontory of Monshi. "On the tide proving favorable," said Commander McDougal in his official report of the affair, "we proceeded in the straits, and discovered a steamer, brig and bark of war at anchor off the town, with Japanese colors at the peak and the flag of the prince at the fore. We stood for the vessels and on approaching were fired on, as we got within range, by six batteries on different positions, mounting from two to four guns each." The main channel lay just outside all the vessels and the Choshiu cannoneers evidently expected to blow the *Wyoming* out of the water for stakes at regular intervals marked ranges

which she was obliged to pass. Already several shot had cut the rigging between the main-and-mizzenmasts. Still no reply came from the intruder. On she came, heading straight for the Japanese vessels, with all hands prepared for boarding.

Then the leading native steamer was seen to have steam up and to be making ready to move. Her decks were crowded with men and from her yardarms hung kedge-anchors to be used as grappling-irons for boarding. Commander McDougal in an instant decided to anticipate the Japanese. Calling his men back to their guns, he gave the order to commence firing. Both pivots and the starboard guns at once opened. "One of the balls of the barbarian vessel destroyed a fort," says the Japanese historian's account of the action, "and, encouraged by his lucky shot, she dashed in." As the *Wyoming* forged abreast of the bark, the latter fired three of her guns, and the gunners on the brig worked their pieces with frantic rapidity. One shot put out of action almost every man at the *Wyoming's* forward broadside gun, two seamen stationed forward were killed by chain shot, and a marine was struck dead by a ball fired from the Sennenji battery. But on the other hand, every shot fired from the *Wyoming's* powerful battery told upon the Japanese vessels which were so close by that the guns seemed almost to touch.

Then a danger hereto feared was realized. The *Wyoming*, after running past the enemy, grounded in the uncharted waters of the strait within range of the guns on shore. The Japanese steamer immediately slipped her cable and took up a position for ramming. But before she could carry out her intention the *Wyoming's* powerful propeller had worked her out of the mud. In his turn, Commander McDougal maneuvered for a favorable position and, training his pair of pivot guns upon the steamer, prepared to give the Japanese a taste of the power of 11-inch Dahlgren ordnance. The first shot hulled the steamer, whereupon a sculling-boat full of officers was seen to leave the ship, while scores of men jumped overboard in terror. The second shell was planted directly in the center of the "Prince of Choshiu's own steamer, the *Koshin Maru*," one foot above the water-line, piercing both ship and boiler and passing into the town a quarter of a mile away where it exploded among a group of buildings. In a moment the doomed ship was on fire both fore and aft, 40 men lay dead on her decks, and black crowds leaped over her side

to escape from the red-tongued flames that licked the sills of every port. "We then steamed past the brig and bark," wrote Lieutenant-Commander George W. Young, the *Wyoming's* executive officer, "firing into them from our port battery and landing a few shells in the shore batteries. At 12.25 p. m. we steamed out of the Strait of Shimonoseki into the Suwo Nada, having passed and repassed the fire of the six batteries, four to the eastward and two to the westward, having been under fire about one hour and ten minutes." And long afterward the Choshiu clansmen spoke respectfully of the "American devils."

From Shimonoseki the *Wyoming* continued her search for the elusive *Alabama* until February, 1864, when Commander McDougal received orders to proceed to Foo-Chow, China, where the interests of the American traders were being violated. "On March 6, I left Foo-Chow," Commander McDougal wrote from Macao on March 13, "and arrived here on the 10th, via Hong Kong," but, he added, "no further information of the *Alabama* has been received here since her landing of the crew of the *Emma Jane*, on the 8th of January last, on the coast of Malabar." So the cruise continued, until, on March 27, 1864, the *Wyoming* reached Batavia, with her boilers in such a condition that there was no alternative but to return to the United States for repairs. The passage from Anjer, via the Cape of Good Hope, St. Helena and St. Thomas, occupied the whole of three months, and on July 13, 1864, the *Wyoming* cast anchor off the Philadelphia navy yard. But other Confederate commerce destroyers had meanwhile been active in home waters. The presence of the *Florida* had recently been reported on the coast, and no Union cruisers were at the moment available for this service. So Commander McDougal was obliged to put to sea again almost immediately in search of the Confederate "pirate." But the *Wyoming's* machinery was in no condition to stand the strain. For five days she attempted to carry out her orders. Then her boilers started to leak and Commander McDougal was obliged to put back into Philadelphia for extensive repairs.

It was not until March, 1865, that the *Wyoming* was again ordered into commission. Then she sailed from Philadelphia on April 17, under the command of Commander John P. Bankhead, and proceeded to the East Indies, via Cape Horn, arriving at Singapore on September 25, 1865, in time to participate in the

search for the Confederate cruiser *Shenandoah*. In 1867 the *Wyoming* was assigned to the Asiatic squadron, and placed in temporary charge of Lieutenant Commander John Bishop (February 14, 1867), until Lieutenant Commander C. C. Carpenter assumed command on April 7. Sailing from Yokohama, on April 28, in company with another vessel, the *Wyoming* conveyed the United States minister on a visit to the Tycoon, an occasion extraordinary on the history of Japan. Thence she proceeded, in June, to the Island of Formosa to participate in a punitive expedition against the natives who had murdered the crew of the American bark *Rover*, which had been wrecked on their coast. This was the last service performed by the *Wyoming* in the Far East. Shortly after she received orders to return to the United States, and in the year following she arrived at Boston where she was placed in ordinary and laid up for repairs (1870-1871) at the Portsmouth navy yard.

From 1872 to 1874 the *Wyoming* was attached to the North Atlantic Station. She was commissioned on November 7, 1871, for special service under Commander John L. Davis, and sailed from Boston on January 16, 1872. On October 25, 1872, Commander Francis H. Baker relieved Commander Davis, and he in turn was succeeded in command by Lieutenant Commander M. L. Johnson (June 22, 1873). Then one month later Commander William B. Cushing was ordered to command the *Wyoming* (July 17, 1873) but after a brief cruise he was ordered to bring her to the Washington navy yard, where she was placed out of commission on April 30, 1874.

During the next two years the *Wyoming* was laid up at Washington. Then, on November 20, 1877, Commander Alfred Hopkins placed her in commission for service on the European Station, where she was commanded by Commander J. C. Watson (February 14, 1878), Commander Silas Casey, Jr. (February 25, 1880), and Commander N. H. Farquhar (March 2, 1881), until her return to Hampton Roads, Va., on May 21, 1881. From here she was ordered to Annapolis, Md., under Captain James E. Jouett (June 15, 1881), where, after a brief visit to Beaufort, S. C., she was turned over to the Superintendent of the Naval Academy on October 30, 1882. In 1892, the *Wyoming* was sold at Norfolk, Va., for $11,311.

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ELECTRIC DRIVE

By LIEUTENANT B. BRUCE, U. S. Navy

It is the purpose of this article to give an idea of the operation of electric drive with so much of a description of the *Jupiter's* installation as is necessary to reach that end. Its simplicity is often remarked upon by those who have viewed it in port, the operation is equally simple and must be seen with the ship underway to be fully appreciated. "Bells" can be answered as fast as it is possible to give them and with perfect ease. There is nothing new in the *Jupiter's* installation of machinery except the main drive, the auxiliaries are of common types and require the usual attention. The main points that commend it to the operating engineer are the ease of upkeep, ease of operation and reliability.

The main propelling machinery of the *Jupiter* consists of the following: One turbo-generator; two induction motors; two water-cooled rheostats; one main switchboard; one exciter switchboard and three exciters (one used for exciting main generator and the others as ship's lighting and power plant); also the usual auxiliary machinery.

The turbine is the General Electric Curtis type. Inside the casing are nine wheels upon the shaft, making nine stages. Upon the periphery of each of these wheels is one row of blades with the exception of the first stage wheel, which has two rows of blades and in between these two rows is a row of stationery blades which extends for a distance of about one-quarter of the periphery. Fitted in between the wheels are diaphragms, which are made in halves, upper and lower, and are fitted to the turbine casing. In the periphery of these diaphragms are the nozzles, which extend from one set of moving blades to the next set of moving blades and entirely around the turbine. The first-stage nozzles are bolted on the turbine head and extend for only about one-quarter of the

periphery, the same distance as the stationery blades of the first stage. When the turbine is running, the throttle is wide open to the steam chest. There are eight passages leading from the steam chest to the first-stage nozzles, each of which is closed by a spring-loaded control valve. A cam shaft extends the length of the steam chest with a cam for each valve, so designed that the valves will be opened in succession. On the end of the cam shaft is a pinion with a rack which gears into it, the rack being on an extension of the piston rod of the hydraulic cylinder.

The operating governor, which is entirely mechanical and geared to the turbine shaft, operates a pilot valve, which allows oil to enter the hydraulic cylinder under about 75 pounds pressure, which moves the piston up or down, thereby opening and closing the control valves. Thus if the load is increased the governor will immediately open more control valves, allow more steam to enter turbine and keep turbine from slowing down; and in case of a decrease in load it will cut off steam to keep turbine from speeding up. The turbine governor is entirely responsible for holding speed constant at the valve set, as the speed of the ship depends entirely upon the governor, since with increase in turbine speed the motors will speed up. It operates so well that even in the gale, experienced by this vessel last December, no perceptible change in turbine speed or motor speed could be detected with the ship pitching the propellers out of water.

The steam passes from the main throttle to the steam chest; through control valves and passages; first-stage nozzles; first-stage blading, consisting of two moving rows and part of a stationery row; second-stage nozzles; second-stage blading, and so through the nine stages to the exhaust space and exhaust trunk to condenser. The condenser is located above turbine.

The moving part of the turbine is carried on two large bearings, with oil cooling pipes cast in the Babbitt metal. Salt water circulates through these pipes to keep bearings cool. Forced lubrication is supplied on starting up and stopping by means of an auxiliary oil pump, which also supplies pressure for operating the hydraulic governor cylinder, the pressure used on the cylinder is about 75 pounds, which is reduced to 25 or 30 pounds for the bearings. When turbine is up to speed, oil under pressure is furnished by a gear pump, geared to the turbine shaft, and the auxiliary pump is stopped automatically. In the turbine base is located the oil reser-

voir from which oil is taken by the oil pumps, circulated through the bearings, the oil cooler, strainer and back to the tank again.

There is only one essential difference between this turbine and the turbines of the same type in power plants ashore and that is in the governor. In turbo-generator sets on shore it is necessary to have but one speed, the normal running speed, and the governor is set permanently so as to give that speed. On this ship, speed of the ship is controlled by changing the speed of the turbine, and it is therefore necessary to be able to set the governor for any desired speed. This is accomplished by making one point movable in the governor mechanism which is ordinarily fixed. A rod runs from this point down underneath the floor plates and comes up in a stand in front of switchboard, where by means of a hand wheel the position of a lever in the governor mechanism may be changed, thus changing the speed at which the turbine will run.

The turbine is limited in speed by the emergency governor which is also of the centrifugal type. It is set for 2300 r.p.m. and at that speed trips the throttle, which is of quick closing type, and shuts steam off entirely. The throttle may also be closed by hand, by means of a wire pull from the operating switchboard.

Directly connected to the turbine is the generator, running at the speed of the turbine, situated upon the same base, with three bearings for the set. The generator is the revolving field type, two poles; normal volts 2300; normal amperes 1370; rated capacity 5450 k.w.; and normal frequency 33.2 cycles. The frequency varies with the speed of the turbine, and the motors run a speed depending upon the frequency and therefore upon the speed of the turbine. The frequency,

$$(f) = \frac{\text{r.p.m. (generator)} \times \text{No. pairs poles (generator)}}{60}.$$

Since the generator has one pair of poles the frequency in this case is equal to the revolutions per second of the turbine. As the turbine goes from 900 r.p.m. to 2280 r. p.m. the frequency would vary from 15 to 38 cycles per second.

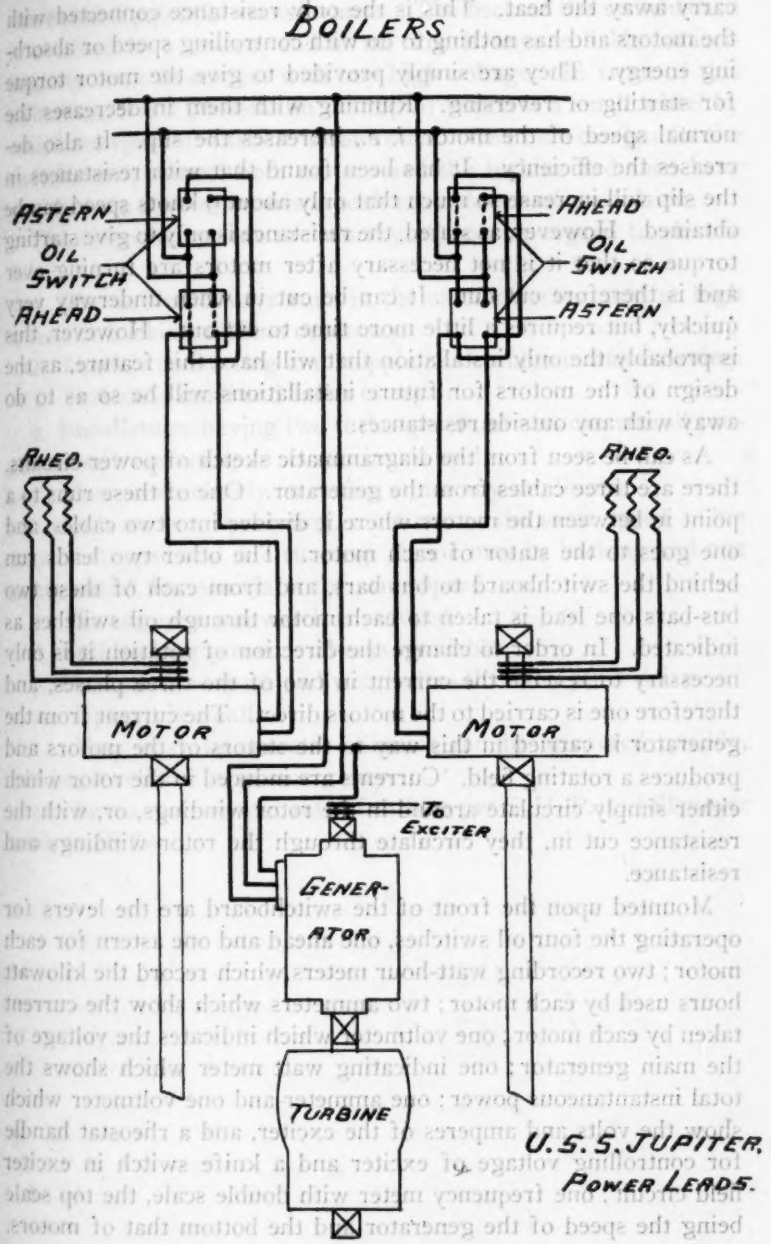
The voltage is varied depending upon the speed, the normal exciting current is 250 amp., which is furnished by one of three 35 k.w. d.c. turbo-generator sets which run at 3600 r.p.m. The field of the exciter can be varied from the main switchboard and can also be opened from that board.

On each end of the revolving field is a fan which takes in air from the bilges, circulates it through the generator, and discharges to an air duct at the top of the generator which leads to the suction to the forced draft blowers. When under forced draft, this heated air is used in the boilers. The generator is totally enclosed with the exception of the opening to the bilge for the intake of air. The three terminals of the three phases lead out to one side of the generator and underneath the floor plates to bus-bars. These leads are heavily insulated with mica and asbestos and insulated from the structure of the ship with porcelain insulators.

The motors, two in number, one on each shaft, are of the induction type. They are rated at 2750 h.p. each, and for a normal speed of 110 r.p.m. The outside diameter of the stator is 10 feet. The stator is wound for 36 poles and therefore the synchronous speed of the motors is equal to $\frac{60 \times f}{\text{No. pairs poles (motor)}}$, and since $f = \frac{\text{r.p.m. (generator)} \times \text{No. pairs poles (generator)}}{60}$, we have that $\text{r.p.m. (motor)} = \frac{\text{r.p.m. (generator)}}{18}$. This would be the speed of motors in case there were no load upon them, but since there is always some load upon them the speed is always a little less than the above.

The speed $\frac{60 \times f}{\text{No. pairs poles (motors)}}$ is the synchronous speed. As stated before the motor will never run at this speed but always very close to it. The amount it varies from this synchronous speed in per cent is known as the "slip." The "slip" will vary from practically zero at light load to about 1.5 per cent at full load.

In a motor of this type, in order to obtain high torque at starting and reversing, it is necessary to introduce a certain amount of resistance in series with the rotor. The rotor windings terminate in three slip rings on the shaft, and it is by means of these rings that the additional resistance is connected. With the resistance cut out these three slip rings are short circuited, which allow the induced currents in the rotor to circulate in the rotor windings only. By the movement of a lever the slip rings are changed from the short circuited state to a condition where the resistance is in circuit. This resistance consists of three calorite coils, which are enclosed in cylindrical headers through which sea water is circulated to


BOILERS
ASTERN
OIL SWITCH
AHEAD
AHEAD
OIL SWITCH
ASTERN
RHEO.
RHEO.
MOTOR
MOTOR
TO EXCITER
GENER-ATOR
TURBINE
U.S.S. JUPITER.
POWER LEADS.

carry away the heat. This is the only resistance connected with the motors and has nothing to do with controlling speed or absorbing energy. They are simply provided to give the motor torque for starting or reversing. Running with them in decreases the normal speed of the motor, *i. e.*, increases the slip. It also decreases the efficiency. It has been found that with resistances in the slip will increase so much that only about 9 knots speed can be obtained. However, as stated, the resistance is only to give starting torque so that it is not necessary after motors are turning over and is therefore cut out. It can be cut in when underway very quickly, but requires a little more time to cut out. However, this is probably the only installation that will have this feature, as the design of the motors for future installations will be so as to do away with any outside resistances.

As can be seen from the diagrammatic sketch of power circuits, there are three cables from the generator. One of these runs to a point in between the motors where it divides into two cables, and one goes to the stator of each motor. The other two leads run behind the switchboard to bus-bars, and from each of these two bus-bars one lead is taken to each motor through oil switches as indicated. In order to change the direction of rotation it is only necessary to reverse the current in two of the three phases, and therefore one is carried to the motors direct. The current from the generator is carried in this way to the stators of the motors and produces a rotating field. Currents are induced in the rotor which either simply circulate around in the rotor windings, or, with the resistance cut in, they circulate through the rotor windings and resistance.

Mounted upon the front of the switchboard are the levers for operating the four oil switches, one ahead and one astern for each motor; two recording watt-hour meters which record the kilowatt hours used by each motor; two ammeters which show the current taken by each motor; one voltmeter which indicates the voltage of the main generator; one indicating watt meter which shows the total instantaneous power; one ammeter and one voltmeter which show the volts and amperes of the exciter, and a rheostat handle for controlling voltage of exciter and a knife switch in exciter field circuit; one frequency meter with double scale, the top scale being the speed of the generator and the bottom that of motors. Leads to all the instruments are taken from the power leads by

current and potential transformers. The back of the switchboard is enclosed by a screen, and at no time is anyone liable to accidentally come in contact with any high voltage. In front of this switchboard is a pedestal on the top of which is a small wheel by which the speed of turbine is controlled. One man can handle the switchboard, control both motors and the turbine and then have very little to do in comparison with other forms of propulsion.

The following points are worthy of note in regard to electric drive:

1. The turbine always runs in the same direction and at high speed, no backing turbine necessary.
2. There is no starting and stopping of turbine in maneuvering.
3. Turbine is small and easier to repair.
4. Installations having two turbo-generator sets can run all propellers with one set up to its maximum load.
5. There is absolutely no racing under any conditions.
6. Both motors, if running, must run at the same speed. One may be stopped and one running, or one may be backing and one going ahead, but always at the same speed.
7. The engine-room watch is reduced.
8. Full backing power is always available.
9. Occupies less space and weighs less than any other drive.
10. Upkeep is small.
11. Very easy to operate. Signals can be answered quickly, making it reliable in an emergency.
12. Saves coal,—water rate of turbine per S. H. P. on full power trial, 11.68 lbs.

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WATER-TIGHT SUBDIVISION OF MERCHANT SHIPS

By Assistant Naval Constructor H. E. Rossell, U. S. Navy

The questions of the water-tight subdivision of ships and of safety of life at sea come before the public for a short period after each great wreck, and are then soon forgotten. They have excited more than usual interest in the last few years, owing to the great loss of life when the *Titanic* and the *Empress of Ireland* went down. The press and technical publications have given much space of late to considerations affecting safety of life at sea. Some of the suggestions brought forward are extremely foolish, while others are undoubtedly of much value and, if put into effect, could not but improve conditions.

The idea of subdividing a ship by water-tight bulkheads to give it greater safety in case of accident is an extremely old one. Admiral Belcher had water-tight bulkheads fitted in the British wooden sailing vessels, *Etna* and *Terror*, in 1830, which later prevented the latter vessel from foundering when her side aft was crushed in by ice. Her after bulkhead held, and enabled her to reach port in safety. The value of water-tight subdivision does not seem, however, to have been generally recognized until steamers came into use.

Mr. Williams, founder and manager of the City of Dublin Steam Packet Co., strongly recommended the use of water-tight bulkheads on iron vessels. In a paper on "Improvements in the Construction of Steam Vessels," read in 1837 before the Mechanical Section of the British Association for the Advancement of Science, he said: "When it is considered that those casualties which too often end in the sinking of a steamer are local in their origin, and affect but a small portion of the vessel, that the water admitted was often so small in extent as to be almost within the power of the pumps, it will at once suggest the importance and the efficiency of the protection by confining the water to that

section of the vessel which has sustained the injury. . . . . The plan is not restricted by any patent, and all are free to adopt it, and I expect hereafter to see this principle so adopted and improved that the security of steam vessels will keep pace with the greater utility of steam and extension to which they seem destined." Mr. Williams further stated that he had introduced water-tight bulkheads into many steam vessels, and that he had practically and experimentally proved their efficiency.

The next great advance in the water-tight subdivision of ships occurred when the *Great Eastern* was built in 1859. She was

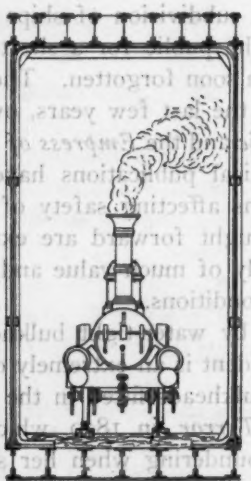

FIG. 1.—SECTION OF "BRITTANIA" BRIDGE

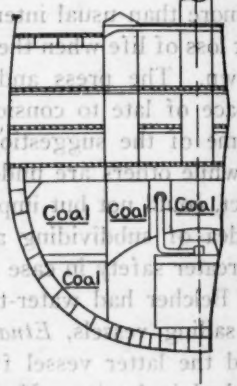

FIG. 2.—MIDSHIP SECTION "GREAT EASTERN"

designed by a French civil engineer, Brunel, with the aid and advice of Scott Russell. She was modeled after the *Brittania Bridge*, as can be readily seen from Figs. 1 and 2. In the *Great Eastern* the inner bottom was more complete than on any merchant ships built until recently. She was much larger than any ship built before or for many years after her, having a length of 680 feet. Although she cannot be regarded as commercially successful, she has given to succeeding generations many valuable lessons in the construction of iron and steel vessels. Had her design been more closely followed in succeeding years, it is probable that the loss of life at sea would have been greatly reduced.

In 1861, Mr. Charles Lungley read a valuable paper on "Un-

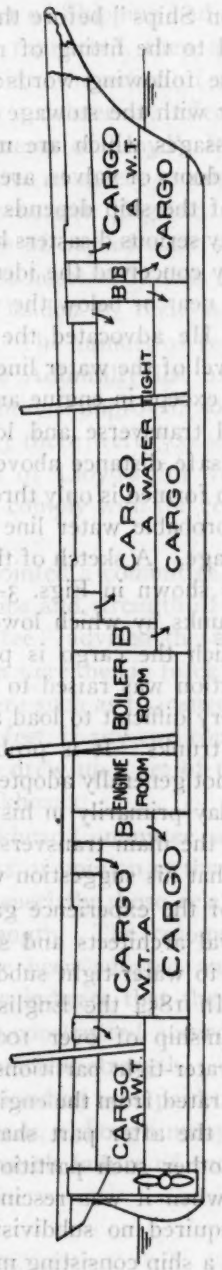

FIG. 3

FIG. 5

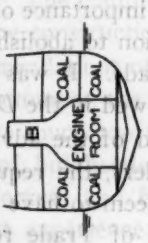

FIG. 4

sinkable Iron Ships" before the Institution of Naval Architects. He objected to the fitting of numerous transverse bulkheads in a ship in the following words: "Such bulkheads also interfere very greatly with the stowage of the ship, and it often happens that the passages which are made through them, and are furnished with doors or valves, are found open at the very time when the safety of the ship depends upon the bulkheads being water-tight. Many serious disasters have occurred from the last cause." Mr. Lungley conceived the idea of so subdividing the ship as to avoid doors near or below the water line in the main water-tight bulkheads. He advocated the placing of a water-tight flat at about the level of the water line, extending throughout the length of the ship, except in engine and boiler compartments. In addition, several transverse and longitudinal water-tight bulkheads extended a safe distance above the water line. Access to compartments so formed is only through water-tight trunks extending above any probable water line at which the ship might float in case of damage. A sketch of the model with which he illustrated his paper is shown in Figs. 3-5. *A* is a water-tight deck, and *B, B* are trunks by which lower compartments are entered and through which the cargo is passed. In the discussion of the paper, objection was raised to the design on the ground that it would be very difficult to load and unload the cargo through the water-tight trunks. It is probably due to this defect that the design was not generally adopted. The importance of Mr. Lungley's paper lay primarily in his suggestion to abolish doors on a low level in the main transverse bulkheads. It was not until 43 years later that his suggestion was followed in the *Dreadnought*.

In spite of the experience gained and of the advice of many eminent naval architects and ship-builders, the requirements of law relative to water-tight subdivision seem to have been regrettably lax. In 1854 the English Board of Trade required that "every steamship of over 100 tons be divided by substantial transverse water-tight partitions, so that the fore part of the ship shall be separated from the engine-room by one of such partitions, and so that the after part shall be separated from the engine-room by another such partition." This act remained in force until 1862, when it was rescinded. After that date the Board of Trade required no subdivision whatever, and would issue a certificate to a ship consisting merely of a hollow shell.

The committee of Lloyd's Register of Shipping had much more stringent regulations. As Lloyd's registered, then as now, the great majority of the world's shipping, the action of 1862 of the Board of Trade did not have such a deleterious effect as might have been expected. The requirements of Lloyd's Register did not, however, insure as great a degree of safety as might reasonably be required. In 1876, ship-owners in England were asked to send to the Admiralty the names of any of their ships which were so divided that they would not necessarily sink if bilged in their largest compartment, when loaded to their normal load water line with cargo in their hold. The number of vessels found so qualified to be placed upon the Admiralty list of merchant naval reserve was only 30. Conditions improved somewhat in the next few years, so that by 1883 there were 300 ships on the Admiralty list. The requirements of Lloyd's for vessels over 300 feet in length would in general comply with the requirements of the Admiralty.

In 1890 the Board of Trade appointed a committee of experts to investigate the subdivision of ships and strength of bulkheads. This so-called "Bulkhead Committee" advised the adoption of requirements much more severe than were then in force by Lloyd's. The recommended requirements were such as to insure the safety of passenger ships longer than 425 feet, if any two compartments were flooded. The committee also drew up a set of tables to be followed in the construction of bulkheads.

The recommendations of the Bulkhead Committee caused much unfavorable comment, the concensus of opinion at the time being that they were much too severe, especially those relating to the construction of bulkheads for strength. The recommendations were not enforced, and have since been adopted on very few ships. Recent experience seems to indicate that they were not severe enough, and that bulkheads constructed according to the tables of the committee have not sufficient strength.

Up to this time, 1890, little attention had been paid to the question of water-tight doors in bulkheads, although many ships had been lost, directly or indirectly, through failure of such doors to be closed at critical times.

LOSS OF THE "VICTORIA"

On June 22, 1893, during maneuvers of a British squadron in the Mediterranean, H. M. S. *Victoria* was rammed and sunk by the *Camperdown*. The squadron was in line of divisions with a distance of about 1200 yards between the divisions, when the signal was made from the *Victoria:* "Second Division alter course in succession 16 points to starboard, preserving the order of the fleet. First Division alter course in succession 16 points to port, preserving the order of the fleet."

The distance between divisions was too short for such a maneuver to be made, and the two leading ships came into collision, the *Camperdown* striking the *Victoria* on the starboard bow at an important transverse bulkhead and at an angle of about 10 degrees abaft the beam. At the time, the *Victoria* was making a speed of about 5 knots, and the *Camperdown,* a speed of about 6 knots. The protective deck of the *Victoria* locked the stem of the *Camperdown* and prevented any ripping action which might have resulted from the speed of the former. The spur of the *Camperdown* was driven about 9 feet within the side plating of the *Victoria* at a depth of about 12 feet below the water, destroying the water-tightness of the transverse bulkhead at this place. The *Camperdown* swung aft through an angle of 20 degrees and backed out clear about one minute after she struck. The *Victoria* settled gradually by the head and took a list to starboard for nine or ten minutes, when water began to flow down through the open gun ports in the turret and through the 6-inch gun ports and the forward door of the casement. This quickly destroyed the stability by reducing the moment of inertia of the plane of flotation. The ship took a sudden lurch to starboard and capsized. Immediately before the lurch took place the upper deck at the bow was 13 feet under water, having been depressed about 23 feet.

One minute before the collision occurred, the captain of the *Victoria* gave orders to close water-tight doors. This was not sufficient time for the execution of the orders, and the men were driven back by the inflow of water immediately after the collision, leaving many doors in the forward part of the ship open or not properly closed. The doors had just been overhauled and were in good condition; the damage due to the collision did not seem to make any of them inoperative.

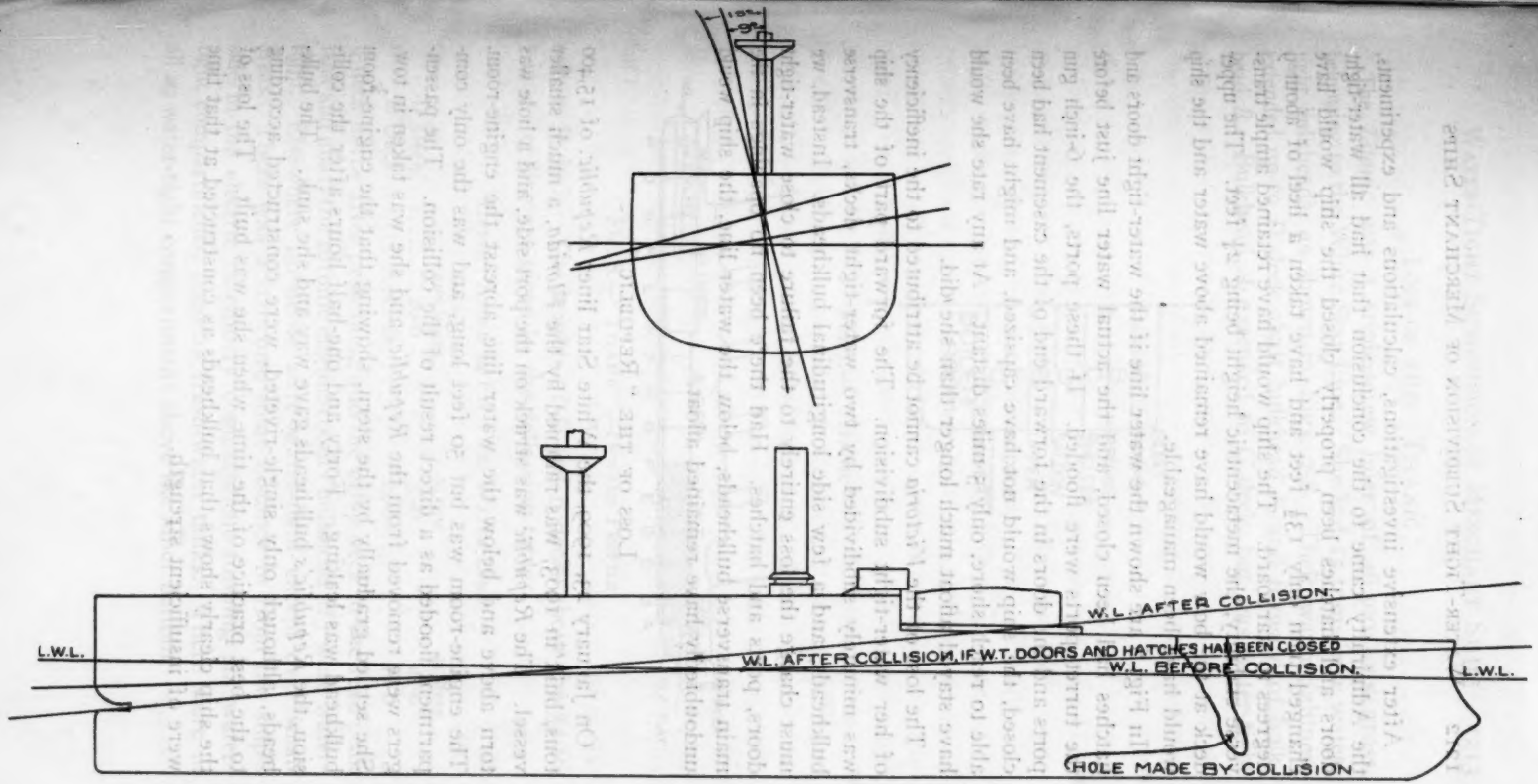

FIG. 6.—H. M. S. "VICTORIA"

After extensive investigations, calculations and experiments, the Admiralty came to the conclusion that had all water-tight doors and hatches been properly closed the ship would have changed trim only 13½ feet and have taken a heel of about 9 degrees to starboard. The ship would have retained ample transverse stability, the metacentric height being 2¼ feet. The upper deck at the bow would have remained above water and the ship would have been manageable.

In Fig. 6 are shown the water line if the water-tight doors and hatches had been closed, and the actual water line just before the turret ports were flooded. If these ports, the 6-inch gun ports and the doors in the forward end of the casement had been closed, the ship would not have capsized, and might have been able to reach shore, only 5 miles distant. At any rate she would have stayed afloat much longer than she did.

The loss of the *Victoria* cannot be attributed to the inefficiency of her water-tight subdivision. The forward part of the ship was minutely subdivided by two water-tight decks, transverse bulkheads, and a few side longitudinal bulkheads. Instead, we must charge the loss entirely to the failure to close water-tight doors, ports and hatches. Had there been no openings in the main transverse bulkheads, below the water line, the ship would undoubtedly have remained afloat.

LOSS OF THE "REPUBLIC"

On January 23, 1909, the White Star liner *Republic*, of 15,400 tons, built in 1903, was rammed by the *Florida*, a much smaller vessel. The *Republic* was struck on the port side, and a hole was torn above and below the water line abreast the engine-room. The engine-room was but 50 feet long, and was the only compartment flooded as a direct result of the collision. The passengers were removed from the *Republic*, and she was taken in tow. She settled gradually by the stern, showing that the engine-room bulkhead was leaking. Forty and one-half hours after the collision, the *Republic's* bulkheads gave way and she sank. The bulkheads, although only single-riveted, were constructed according to the best practice of the time when she was built. The loss of the ship clearly shows that bulkheads as constructed at that time were of insufficient strength.

LOSS OF THE "TITANIC"

The *Titanic* was a triple-screw liner of 46,300 tons gross, belonging to the White Star Line. She had 15 transverse water-tight bulkheads, as shown in Figs. 7-8. Their water-tightness extended up to *D* deck abaft bulkhead *K* and forward of bulkhead *B*. Bulkhead *A* extended to *C* deck, but was water-tight

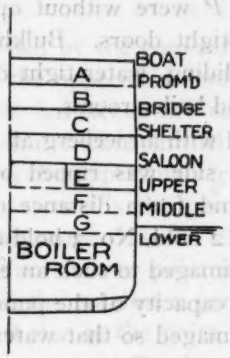

FIG. 7.—"TITANIC"

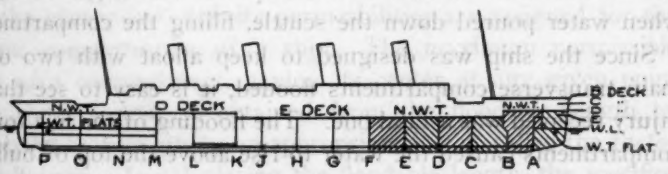

FIG. 8.—"TITANIC"—INWARD PROFILE

only to *D* deck. The heights of *D* and *E* decks above the 34 ft. 7 in. water line are given by the following table:

HEIGHT ABOVE 34 FT. 7 IN. WATER LINE

	Lowest part amidships	At bow	At stern
D Deck	20-0	33-0	25-0
E Deck	11-0	24-0	16-0

G deck in the after peak tank, and the orlop deck in the fore peak tank and abaft the turbine engine-room (bulkhead *M*) were water-tight. Elsewhere no decks were water-tight except over small areas. There was a structure some distance in from the ship's side in the electric machinery compartment forming six water-tight compartments, used as fresh-water tanks. There were in all 29 water-tight compartments above the inner bottom.

There was an inner bottom about 5 feet from the outer skin, extending from bulkhead *A* to 20 feet forward of bulkhead *P*. For about half the length of the ship the inner bottom extended to a height of 7 feet above the keel, but at the ends of the ship it did not extend to such a height. The space between inner and outer bottoms was divided into 44 water-tight compartments. Bulkheads *A*, *B* and *P* were without openings. All the other bulkheads had water-tight doors. Bulkheads *D* to *O* inclusive each had a vertical, sliding, water-tight door at the level of the floor of the engine- and boiler-rooms.

The *Titanic* collided with an iceberg at 11.40 p. m. on April 14, 1912. The starboard side was ripped open at a height of 10 feet above the keel and for a distance of 300 feet. The fore peak, No. 1 hold, No. 2 hold, No. 3 hold and the forward boiler-room (No. 6) were damaged to such an extent that the inflow of water was beyond the capacity of the pumps. The second boiler-room (No. 5) was damaged so that water poured in as it would from an ordinary fire hose. The upper part of the fore peak was not flooded until the bow of the ship was submerged to deck *C*, when water poured down the scuttle, filling the compartment.

Since the ship was designed to keep afloat with two of her main transverse compartments flooded, it is easy to see that the injury received was a fatal one. The flooding of the five forward compartments caused the water to rise above the top of bulkhead *E* and to pour down into boiler-room No. 5 and fill it up until the water rose above the top of bulkhead *F* and flooded the next boiler-room, and so on until the ship sank. If the forward five compartments had been completely flooded, the ship could still have been saved had the bulkhead deck (deck *E*, amidships) been made effectively water-tight, as it had water-tight trunks, extending up to *C* deck, around all openings in the bulkhead deck.

No evidence was brought forward in the investigation to prove that the water-tight doors did not function properly or had any influence on the sinking of the ship, or that any bulkheads failed. There is some doubt, however, as to whether the bulkheads, which were only single riveted, could have stood up long enough to enable the ship to reach port in safety under her own steam.

CONVENTION FOR SAFETY OF LIFE AT SEA

Following the *Titanic* disaster, an International Convention for the Safety of Life at Sea was held. It was signed by representatives of all the great powers in January, 1914. The articles are applicable only to merchant ships, mechanically propelled, carrying more than 12 passengers, and engaged in international trade.

Certain terms are defined by the convention as follows:

The ***bulkhead deck*** is the uppermost continuous deck to which all transverse water-tight bulkheads are carried.

The ***margin line*** is a line drawn parallel to the bulkhead deck at side and 3 inches below the upper surface of that deck.

The ***permeability*** of a space is the percentage of that space which can be occupied by water.

The ***floodable length*** for a given point in a ship, with a continuous bulkhead deck, is the maximum percentage of the length of the ship, having its center at the point which can be flooded (under certain assumptions) without the ship being submerged beyond the margin line.

By the convention, definite permeabilities are assigned for the different compartments of a ship. The maximum permissible length of a compartment, having its center at any given point in the ship's length, is obtained from the floodable length by multiplying that length by an appropriate factor, called the ***factor of subdivision***. In calculating the floodable length, the specified permeability for that part of the ship is used. The factor of subdivision is a function of the length of the ship and the service on which she is engaged, and is taken from curves given by the convention. The degree of safety required is therefore very properly greater for large ships than for small ones, and greater for passenger ships than for mixed passenger and cargo ships.

The convention requires fore and after peak bulkheads at appropriate distances from the ends of the ship. It also requires that water-tight bulkheads shall be constructed so as to be capable of supporting the pressure due to a head of water to the margin line, but does not lay down any fixed rules or tables for the construction of such bulkheads.

The convention recognizes the desirability of cutting down the number of water-tight doors to a minimum. It allows no doors below the margin line in the collision bulkhead or in bulk-

heads between cargo spaces. It does, however, permit one door in each main transverse bulkhead in the machinery spaces (including boiler and engine rooms).

In regard to inner bottoms, certain regulations are laid down, as follows:

Ships of 200-249 ft.: Inner bottom from machinery space to fore peak.

Ships of 249-300 ft.: Inner bottom from machinery space to fore and after peaks.

Ships over 300 ft.: Inner bottom from fore peak to after peak, extending out far enough to protect bilges.

Ships over 699 ft.: Inner bottom for at least half ship's length amidships and forward to the fore peak shall extend up ship's side to a height above the top of keel not less than 10 per cent of ship's moulded breadth.

It will be noted that the convention does not require any deck to be water-tight.

REPORT OF BULKHEAD COMMITTEE

At about the same time that the International Convention met, the Board of Trade appointed a Bulkhead Committee to investigate the question of water-tight subdivision of merchant ships. This committee has investigated the subject in a very thorough manner, and in January, 1915, made public that portion of its report dealing with ships carrying more than 12 passengers. As the convention received a preliminary report from the Bulkhead Committee and adopted many of its suggestions, it is natural that the recommendations as set forth in the committee's report should agree with those of the convention. There are, however, certain important differences.

As a result of tests on a cofferdam, the committee gained much useful information regarding the strength of bulkheads. Tables of scantlings, of brackets, and of stiffeners to be adopted in new construction are given, which are considerably in excess of the existing general practice.

The requirements as to the spacing of transverse bulkheads are slightly more stringent than those of the convention. Distance between bulkheads is determined by a series of curves, making individual bilging calculations unnecessary.

The committee recommended the mean permeability of the whole vessel as a suitable citerion of service on which to base the factor of subdivision.

If a water-tight deck is fitted, it should not be below the level of the load water line at any part of its length. The committee recognizes the value of such a deck against the effects of a long ripping blow, but does not consider it of great value against effects of collision. No increase in the spacing of transverse bulkheads is permitted when such a deck is fitted.

Longitudinal subdivision and inner skins extending up the sides are entirely optional even in the largest vessels. If they be fitted, it must be proved by calculation that the margin line will not be brought under water when any space bounded by a transverse water-tight partition between outer and inner skin or longitudinal bulkhead on one side is flooded for a length equal to the floodable length of the vessel in that region. The committee recommends, however, that the tank top plating be carried out to the ship's side at a height not less than that at the center, as specified by the classification society or other authority responsible for the scantlings.

CONCLUSIONS

In planning the water-tight subdivision of a ship we must have clearly in mind three factors, namely: *Safety, profit* and *speed*. Perhaps unconsciously, the owner is likely to place profit first and speed second, and to give only such consideration to safety as is required by law or as is necessary to keep down the insurance rate to a reasonable figure. Curiously, we cannot rely on the public to insist on safety above all else. Except for a short period after each great wreck, the public pays little attention to safety, and less to profit, but demands speed at all costs.

Obviously a ship must be so designed as to make her operation profitable; otherwise she could not be run at all. In considering the question of safety, we must try to give the maximum safety which will still permit her to yield a reasonable profit. This maximum safety should clearly be a function of the size and service of the ship. Fortunately this principle may be worked out in practice; for adequate subdivision is given to a large ship much more easily than to a small one, while keeping expense of building and operation down to a reasonable figure. It is also easy to give greater safety to a passenger ship than to a cargo ship. Speed of passenger ships should be regarded as a luxury to be paid for by those demanding it.

Bearing the above principles in mind, we should next consider the casualties against which the ship should be protected and the means we have at our disposal for accomplishing this. In general, the accidents endangering the life of a ship for which we should provide to a greater or less degree by water-tight subdivision, are as follows:

(1) Being rammed by another ship.
(2) Ramming another ship.
(3) Grounding or running upon the rocks.
(4) Striking a derelict, iceberg, or other floating body.
(5) Flooding due to leaks in the skin of the ship.
(6) Flooding due to seas coming over the ship or through openings in the sides.

Of these the first two, because of the greater chance of their occurring, are by far the most important. They should therefore receive more consideration in the designing of the water-tight subdivision than any of the other possible accidents. Grounding is much more likely to occur on ships engaged in one kind of service than on those engaged in another. For instance, the chance of a trans-atlantic liner grounding is very remote, while the chance of a tramp steamer running upon an uncharted rock is not small. The danger of a ship's striking a derelict, iceberg, or other floating body is not great. The author could find record of only three ships having collided with icebergs in the last 30 years. The flooding by seas coming through openings in the weather deck or in the sides of the ship is much more likely to occur in a small ship than in a large one, while the springing of leaks is caused principally by lack of structural strength in the hull of the ship.

To give protection against the effects of these various accidents, we have water-tight bulkheads, inner bottoms, water-tight decks, or flats.

Water-tight Bulkheads.—There seems to be no question that all ships should be fitted with as many main transverse bulkheads as practicable. The distance between such bulkheads depends upon the size and service of the ship. In any case, such bulkheads should be carried to such a height above the water line that the upper edge will not be reached by the water in any case of flooding, after which the ship may reasonably be expected to remain afloat. These main transverse bulkheads protect princi-

pally against the effects of being rammed. Since ramming is likely to occur at one of these bulkheads, they should, if possible, be close enough together to permit two main compartments to be flooded without the tops of the bulkheads going under water. Of course, for large passenger ships the spacing should be much closer. There should be one or two collision bulkheads forward, carried up one or two deck-heights higher than the other main transverse bulkheads, and there should also be an after peak bulkhead. The object of these bulkheads at the ends of the ship is primarily to guard against the effects of ramming another ship.

The question of the advisability of having longitudinal water-tight bulkheads is one upon which there is much difference of opinion. Longitudinal center-line bulkheads in the large compartments are to be avoided, since in cases of flooding they are likely to cause the ship to take a dangerous heel. Side coal-bunker bulkheads are not generally open to this objection, and may prove very valuable in case of a long ripping blow, such as would be given by an iceberg or a derelict. In cases of collision between two ships, there is also sometimes this tearing action. Such was the case when the *Grosser Kurfürst* was rammed and sunk by the *König Wilhelm*, the headway of the former causing considerable tearing of the bottom plating. Longitudinal bulkheads in the ends of the ship serve to divide the space more minutely, and undoubtedly make for greater safety. There seems to be no objection to dividing the engine-room space into three parts by longitudinal bulkheads, as is done on the *Aquitania*. If fitted, longitudinal bulkheads should be carried water-tight either to some water-tight deck or to the same height as the main transverse bulkheads.

Inner Bottoms.—Nearly all ships have an inner bottom throughout the machinery spaces but extending only over the flat part of the bottom. Especially in long ships, the structure between the two bottoms is essential to get sufficient strength for the hull. The space so found is generally subdivided and used as ballast, oil, or reverse feed storage tanks. The depth of such compartments is ample for protection against the effects of grounding under them. With such an inner bottom, a ship is open to a great amount of flooding from a long ripping blow dealt anywhere from the turn of the bilge up to the water line. It therefore seems advisable in large liners to extend the inner bottom

up the sides as far as the water line from the collision bulkhead to the after engine-room bulkhead. In places where there are side bunker bulkheads, this may not be necessary, but it still seems advisable for the largest ships. Side compartments in the double bottom may be of use in bringing the ship on an even keel in cases of dangerous heeling.

Another way of protecting the side of the ship from the turn of the bilge up is to fit wing bulkheads entirely independent of the ship's side framing, at a distance of about 8 feet from the side. The space outside the wing bulkheads would be regarded as double-bottom space, and could be entered only through water-tight man-holes. Such an arrangement would of course be somewhat wasteful of space, but on large liners having transverse bunkers these bulkheads could without great difficulty be fitted throughout the boiler-rooms.

Water-tight Decks or Flats.—Water-tight decks or flats at or below the water line may be useful in confining the extent of the flooding in the case of a long ripping blow beneath them, or they may serve to prevent the tearing action in the case of collision. The protective deck of the *Victoria* was useful in the latter capacity. The bow has a water-tight deck at about the level of the water line which strengthens it and lessens the danger in case of ramming another ship. It is, however, the general opinion that water-tight decks are more useful when placed above water. On large liners it seems advisable to make the bulkhead deck effectively water-tight throughout its length. In order to do this, openings in the deck must either be fitted with water-tight hatches, or trunks must be fitted around the openings and carried to one or two deck-heights higher. This prevents the flooding of any main water-tight compartment, should a heel or a trim cause the bulkhead deck to be submerged.

Strength of Bulkheads.—It is of vital importance to construct all main water-tight bulkheads in such a manner that even in the most serious cases of flooding they will remain tight in fact as well as in name. This matter has not received sufficient attention until quite recently. It is to be hoped that the recommendations of the Bulkhead Committee will work a needed reform in this regard.

Water-tight Doors.—Water-tight doors in a main bulkhead are always a menace. Even if they are of the most approved

type and are fitted with all imaginable safety devices, it is never sure that they will work when most needed. They may be warped by the effects of an accident, or may be temporarily out of order, or may be blocked by something solid washed under them. These and many other things might happen to prevent them from closing. Their use below the bulkhead deck should be avoided if possible. In any case they should not be permitted below the water line in the main transverse bulkheads. Not to have doors between boiler-rooms is no doubt an inconvenience, but it is better to sacrifice convenience than to sacrifice safety.

EXAMPLES

The latest liners follow, in a general way, the principles laid down above. The *Aquitania,* the latest Cunard liner, Fig. 9, has

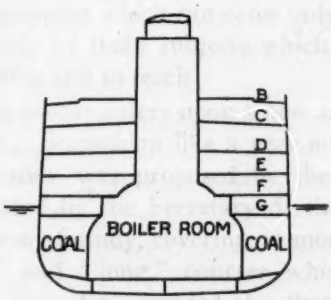

FIG. 9.—"AQUITANIA"

side coal-bunker bulkheads together with inner bottom carried to the turn of the bilge. There is a water-tight deck carried at about the water line for the whole length of the ship. Forward and aft there are water-tight trunks for each cargo hold from this deck to the weather deck. The water-tight subdivision of this ship is almost exactly like that suggested by Mr. Lungley in 1861, Figs. 3-5.

Another system of subdivision is illustrated by the White Star liner, *Brittanic,* of 50,000 tons gross. She has transverse bunkers, and has an inner skin 30 inches from the outer shell, extending up to 6 feet 6 inches above the load water line throughout the machinery spaces. In addition to this she has 16 transverse

water-tight bulkheads, of which five extend to the level of the bridge deck, 40 feet above the load water line. The construction of these two liners illustrates the tendency on the part of ship-builders and owners to profit by experience, and to pay more attention to the proper water-tight subdivision of ships. The terrible lessons of the last few years have also gone far to dissipate the popular delusion that ships can ever be made "unsinkable."

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

AIMS AND METHODS OF THE WAR COLLEGE[1]

By Rear Admiral Austin M. Knight, U. S. Navy
President U. S. Naval War College

I have much pleasure in welcoming you to the War College and in looking forward to a year of association and of co-operation with you in fields of work where we of the College staff are, equally with you, seekers after truth, and, equally with you, in need of the enlightenment which can come only from earnest and thorough-going study of those subjects which it is the object of the College to develop and to teach.

The War College to-day enters upon a new and important stage of its development. Something like a year and a quarter ago a plan of reorganization was proposed by the President of the College and approved by the Secretary of the Navy, providing for a uniform course of study, covering 12 months, to replace the so-called "short" and "long" courses which had previously been recognized. The plan provided also that the course should be taken by two classes of 15 officers each, beginning, one in January, the other in July, of each year. This plan goes into full effect with the present class, which, I am glad to be able to inform you, will, before the end of the present month, consist of 19 members.

Thus, after many years of struggle, during which the very existence of the institution has been threatened more than once, a point has been attained from which it is possible to look out upon an assured and inspiring future. From this time forward we who represent the College shall have no need to beg for recognition. It has become our privilege to give, rather than to ask; to be sought for, rather than to seek. Our concern must be

[1] Address delivered at the opening of the course for the Class of July, 1915.

hereafter to make sure that in giving we give worthily and with increasing measure of helpfulness to those whom it is our privilege to serve.

You who join us to-day join the College in the fullest sense. You become a part of the institution—as truly a part of it as those who, by reason not of greater wisdom but of greater experience, become your guides. You will find no one here to tell you what is the right way, but many who will gladly help you to find the right way for yourselves.

I propose to give you this morning a brief statement of the aims and methods of the College and a general view of the work which lies before you, and of the way in which the course develops —each part leading, in intent at least, to that which follows, and preparing the way for it. You will find, as you go on, that this ideal of progressive development, like many of our other ideals, is far from being fully realized; but this is only another way of saying that the College is still in process of evolution.

We say, broadly, that the College exists for the study of the art of war. If our course is to be defined in a few words, I do not think that we can improve upon this statement. But we must reduce the matter to lower terms than this before we can discuss it satisfactorily. Of what, then, does the art of war consist? War has been defined as an effort on the part of one nation to impose its will upon another by force of arms. But the national will is simply the expression of the national policy; so that if we accept this definition, we must recognize war as a phase of policy. Thus, *policy* becomes a starting point for our present purpose, and takes its place as the first of the elements with which the art of war must deal.

Policy tells us what to do. Where shall we look for guidance as to the manner of doing it? Manifestly, to *strategy;* for strategy, in its widest sense, includes all that goes to the realization of the ends of policy, whether through diplomacy or through that application of armed force which we call war. Thus strategy becomes a second element in our study of the art of war. To properly apprehend its full significance, we must trace it backward to its origin in policy and follow it onward to its manifestation in tactics; for, as strategy springs from policy—being, in fact, policy incarnated as action—so tactics springs from strategy; being, in its turn, strategy incarnated as violence.

Tactics, then, is the third of the subjects with which we deal in our study of the art of war; and policy, strategy and tactics together comprise a trinity which directs the operations of war.

But war needs something more than direction. It needs the material support of supplies, which must be prepared in advance and delivered with certainty when and where they are needed. And this brings us to logistics, a fourth element in the art of war, and perhaps the most vital one of all. It is possible to conceive of a campaign being won in spite of poor strategy and blundering tactics. But a campaign in which supplies of food and fuel and ammunition fail is foredoomed to disaster. If you ask me for the derivation of the word "logistics," I shall have to confess that I have no satisfactory reply. If you ask for a definition of it, I will say that, in my conception, it represents the art of equipping, moving and supplying forces.

The art of war, then, must include a thoroughgoing study of logistics, and a recognition of its insistent and imperative demand upon the attention of those responsible for the conduct of war.

I need hardly direct your attention to the fact that when a war has already become imminent, the time has passed for proper consideration of any one of these four correlated subjects. A nation which finds itself upon the verge of war without the guidance of a clearly-defined policy is already half defeated. If it has given no thought to what shall be done, it can evidently have given none to the manner of doing it. Thus, its strategy must be improvised, its tactics must wait upon the development of its strategy, and its forces must be halted until logistic preparations can be made which should have been completed long before.

The present almost world-wide war has many lessons for us as naval officers and Americans. Among these lessons, one stands out so clearly that they who cannot read it must be blind indeed. I speak of the lesson that success in war can come only from preparation, and this not alone in a material sense, but in an intellectual and a moral sense as well. This is neither the time nor the place for a discussion of our lack on the material side. Our deficiencies in battle-cruisers, scouts and aeroplanes are accentuated anew with every maneuver that is conducted at the College, and must have been brought home in a very striking way to everyone in the fleet, by the War Game recently played off the Atlantic Coast.

To bring out such deficiencies as these, to define clearly their effect upon our strategy and tactics, and to strive for their correction—all this is an important part of the work of the War College. But it is not the most important part. The ideals of the College aim at something beyond and above this. Preparedness for war is too often considered on the material side alone. It has another side which is of greater significance to us, and it is the privilege of the War College to deal chiefly with this side; with the development, not of material, but of principles, and, more important still, of *men*.

Your contribution toward preparedness is to prepare yourselves. And the contribution of the War College is to assist you in this preparation. We say, then, that the mission of the War College is to develop the principles underlying the art of war and to train officers in the application of these principles to situations such as may conceivably arise in war or in preparation for war. More briefly, it is to train officers for war command. Please note this statement of our mission carefully; for until you grasp its full significance, and recognize its limitations, you will be in danger of finding yourselves not only out of sympathy with our methods, but in direct antagonism to them. It is a common thing for officers coming here with false views of the purpose for which the College exists, to take an attitude toward certain parts of the course which has been described as "fighting the problems." A concrete illustration will make my meaning clear. Suppose that in our studies of strategy a problem is issued in which the assumption is made that a certain island can be held by our army for a year. An officer who happens to be familiar with the defenses of the island in question immediately announces that the problem is wrong because he knows positively that this island could not be held for a month. If the object of the problem were to develop a *war plan*, his criticism would be just. But this is not the object. The object is to furnish a basis for an instructive study in the conduct of war, and such study need bear no relation to conditions actually existing. A problem is a good one, if the conditions, real or assumed, are consistent with each other, and if it admits of a solution derived from these conditions by a logical process of reasoning.

There are, nevertheless, many advantages in taking conditions as they actually exist when these can be made to serve the purpose.

The atmosphere of reality with which they invest the problem adds much to the interest, and there are certain by-products resulting from the study of such conditions which are of great, though not the greatest, value.

The point which I wish to impress upon you is that you are to deal with the conditions which you find in the problems—not with those which you think you ought to find there. For you, the conditions exist if the problem says that they exist.

The system used in our work is that known to modern educators as the "case" system or the "applicatory" system, in which general principles are developed through the study of individual situations. This is the exact opposite of the ordinary system of education, in which principles are first studied in their general form, and afterward applied to individual cases. One system proceeds from the general to the particular, the other from the particular to the general. I am confident that your experiences here will convince you of the very great value of the applicatory system for our purposes.

* * * * *

One of the first subjects which you will take up is a series of collective readings on simple tactical problems, beginning with the classical letters of Griepenkerl, and concluding with a few selected problems in naval warfare. The primary object of these readings is to illustrate the method of studying a situation and reasoning from it to a decision, which is then thrown into the shape of orders for the guidance of those who are to carry it into effect.

In these readings you will make your first acquaintance with the "Order Form"—not exactly in the shape in which you will be called upon to use it, but without any important difference in essentials. In these readings, also, your attention will be called to the importance of a thorough study of all the elements which enter into your problems; in other words, to what we call the "Estimate of the Situation." In this matter, as in the Order Form, Griepenkerl's treatment differs from ours, but the difference is one of form alone; and you will find it advantageous to study carefully the rules laid down by Griepenkerl in the introduction to his letters.

Both the Estimate of the Situation and the Order Form will be discussed in lectures very early in the course. Their importance as guides to your study, not of strategy and tactics alone, but of

other and less important subjects, will become increasingly apparent as your course proceeds. I urge you, therefore, to give them your earnest attention from the very beginning.

If these lectures and readings accomplish the purpose for which they are designed, they will equip you for taking up the real work of the College, to which they are preliminary, by pointing out to you the road along which you are to seek the two great ends at which our training aims: First, a recognition of the underlying principles of the art of war; and second, the mental training which will enable you to apply these principles correctly, and more or less instinctively, to concrete situations arising in practice. The first part of the road we travel *with* you; none of it can we travel *for* you.

The first problems presented to you will deal with simple tactical situations, each one designed to illustrate an elementary principle, and affording practice in estimating situations and framing orders. These will be followed by studies in Scouting and Screening—subjects which are partly tactical in character and partly strategical.

Your study of Strategy begins in the second month of the course, with simple problems, which will be followed by larger ones, the scale increasing as consistently as is found practicable, and leading up to the culmination of our course, the Chart Maneuver, where we approach closely the conditions of an actual campaign.

At this point it will be advantageous to consider a little more fully what is meant by "strategy" and what by "tactics." If we cannot frame exact definitions for these terms—and it will be difficult to do this—we may still be able to arrive at a recognition of the principles for which they stand. It is often said that strategy governs the movement of forces not in contact with the enemy, while tactics governs them after contact is made. This statement is only partially true; and if it were entirely true, it would be only a step toward a definition. Moreover, it is misleading in that it assumes to draw a line at the point where strategy ends and tactics begins; whereas, in fact, there is no point at which such a line can properly be drawn.

To my mind, tactics appears as merely a phase of strategy—the final phase which strategy assumes, when, having conducted our forces to points of advantage, it draws its lines to a focus and delivers the attack for which it has prepared from the beginning.

If I may be permitted a somewhat fanciful figure of speech, I will say that strategy is an arrow of which tactics is the head. Both strategy and tactics, then, have a common purpose: to bring to bear upon the enemy a maximum of pressure at the point where it will produce the maximum of effect for the accomplishment of the end at which we aim.

It has already been noted that the strategy of a far-sighted nation does not begin with the beginning of war. It has its origin far back in the history of international relations and runs parallel to national policies, taking account of the purposes at which these policies aim, and planning methods by which they may be attained. When war is seen to be imminent, strategy takes charge of forces already prepared and directs them along lines already marked out, toward points from which to strike or to exert compelling pressure without the necessity of striking. As this point is approached, the operations pass gradually—not abruptly—under the guidance of tactics, which, as we have seen, takes charge of the situation not as replacing strategy, but as executing its will.

The term "tactics" is sometimes used in a very narrow sense as referring to the tactical maneuvering of forces when no object is in view beyond the maneuvers themselves or beyond the training of officers to execute the maneuvers with precision. No doubt there is an art which concerns itself with maneuvering alone, taking no account of anything beyond; and no doubt also there is authority for calling this "tactics"; but it will tend to clear thinking if we adopt for it some such term as "tactical maneuvering" and reserve the term "tactics" to signify that sort of maneuvering which is directed toward the attainment of a definite object—this object being always and everywhere to gain an advantage over the enemy, usually by the concentration of force against some part of his formation.

* * *

I have said that every problem presented to you will have in view the development of some principle. This is very important. There is little to be gained by merely placing two forces in a certain relation to each other and calling upon their commanding officers to maneuver for an advantage. It signifies nothing that a certain officer has out-maneuvered another, unless the maneuvers have taught some lesson. As many lessons may be learned from defeat as from success if *principles* are kept in mind and applied

consistently. The element of competition adds to the interest of the maneuvers, but it should never be allowed to obscure the real end in view, which is to develop new principles or to illustrate the application of those already known. I urge you, therefore, to consider carefully the effect of every move you make and to have a reason for making it, remembering that a bad reason is better than no reason at all. You will be required, after each problem, to state the lessons which you have learned from it. If you keep this requirement steadily in view, it will prove an incentive to be on the alert for lessons as the problem progresses, studying the moves of others no less closely than your own, seeking to penetrate their plans, and criticizing both their plans and your own in the light of results.

When you have once formed a plan, you should adhere to it until you are very sure that you have something to gain by changing it. Frequent changes of plan cause subordinates to lose confidence in a leader and the leader to lose confidence in himself. This does not mean, however, that you should refuse to accept an opening which promises success merely because it will take you along a line not contemplated in your original plan. Distinguish always between firmness and obstinacy. Consistency may be bought at too high a price. Let your rule be this—decide upon the wisest plan that you are capable of devising, and hold to it until you are convinced that you can improve upon it. Then be as resolute in changing as you have previously been in refusing to change.

Our work in both strategy and tactics is governed by rules which have been very carefully developed and written out for your use in great detail. It is of much importance not only to you but to the officers of the staff who direct the maneuvers, that you should understand these rules thoroughly, and that you seek opportunities for familiarizing yourselves with them by officiating as assistants on the game board and in the chart-maneuver room. An intimate acquaintance with the rules prevents the games from dragging, and adds to the interest by insuring that each participant shall know how to take advantage of every opening that presents itself. No doubt the rules will in some cases appear to you unreasonable. They are based upon experience in cases where experience is available; and in other cases, upon what has seemed to us a reasonable estimate of probabilities. Suggestions for improve-

ment are always welcomed, especially when they are the result of observations afloat; but so long as the rules stand, we must all look to them for guidance. It is much the same with the decisions of the umpire. These may often be in error, but they must be accepted if the game is to go on. Their acceptance will be easier, the more fully you accept the point of view which I have urged upon you—that the real object of the maneuvers is to develop principles, rather than to out-maneuver an antagonist.

* * *

Of our work in International Law I need not speak very fully, as all of you have had something to do with this in years past. The methods heretofore in use have proved so satisfactory that no important changes have been found necessary, except that the committee system has been done away with in this as in other parts of the course, and each officer now submits an individual solution of every problem assigned him. You will find some important changes in the general character of the subjects dealt with, resulting from the present unprecedented conditions in international relations throughout the world. When the European war is over, there will necessarily be a re-adjustment of many questions which a year ago we considered permanently settled; and when that time comes, we hope that the War College may be found ready, as has so often been the case in times past, with proposals which will command attention, if not acceptance, in connection with the subjects in which we are particularly interested.

* * *

The part of our work which has called out most criticism from those who have recently taken the course is that which requires the writing of theses. Yet I believe this to be one of the most valuable parts of the course. The topics which will probably be assigned you this year are Strategy, Tactics, Logistics, Policy, Organization, and Loyalty and Initiative. In connection with these topics a reading course is prescribed, the afternoon periods throughout a large part of the year being left free for this reading and for the preparation of theses. You will miss much of the value of this work if you fail to understand its motive. To say that the College does not look to your theses for any important contribution to its stock of knowledge might appear to take something from the dignity of your work. I will not say this. But

I will say that whatever benefit the College may derive from it will be altogether secondary to the benefit which *you* derive from it. Here, as always, we are seeking to help you. And here, more than at almost any other point, you are in a position to help yourselves. No one running through the list of officers who begin the course to-day can doubt that the theses which they submit will have a permanent value for the College. But still less can any one doubt that in the preparation of these theses they will so select and arrange and digest the material with which they deal as to make it wholly their own. And this is what we seek.

For you, then, a thesis represents a thorough study of one of the most important subjects of your profession, involving the careful weighing of authorities, a choice between conflicting views, a gradual absorption of the views which you accept, and, finally, an orderly presentation of the whole matter, with a resulting clarification of it in your minds. For the College, the thesis is a concrete evidence of your thoroughness. It is also, in many cases, a valuable contribution toward the literature which we hope sooner or later to give to the Service. If I have seemed to minimize the importance of this side of the matter, it is only because I like to keep always to the fore the fact that what we aim at first of all is *training*.

The connection between the theses and the reading course is very close and has led to the suggestion that the reading course might be condensed by bringing together extracts from many authors on subjects like strategy and tactics, thus saving time which is now wasted in searching through many volumes for the comparatively small amount of material which is directly available for our purposes. This is what might be called a "tabloid" system of education. As a means of saving time it has advantages. As a means of education, it seems to me fatally defective. I do not admit that the time spent in reading a volume is wasted, merely because only a small part of the volume is found directly available for our immediate purpose. An author may condense his conclusions into a few pages, but it does not follow that we have nothing to gain from traveling with him the road by which he reaches these conclusions. It may be that the road will lead us to quite other conclusions. If not, we shall find ourselves agreeing with him as a matter of conviction, not as a matter of faith.

In my opinion, there is no more valuable result to be anticipated from even a technical education than the broad culture derived from a course of reading generously conceived and not too narrowly concerned with questions of practical utility. Something of this we can put into your course, limited as it is—and a something which will enrich your experiences here with memories capable of becoming a source of pleasure and of inspiration long after you have forgotten the labor which you find so irksome now.

Your course of reading will include the papers written by members of previous classes, and I feel sure that in these you will find abundant evidence of the value of the system which has produced them. Some of them have such conspicuous merit that we hope to publish them sooner or later for the benefit of a wider public than they can reach in their present form. It is hoped, also, that a compilation may be made from these and later papers, composite treatises, which may serve as text-books for the College, not to take the place of the general course of reading which I consider so valuable, but as a guide and a supplement to that course and as adapted more directly for study than for reading. Such text-books will bear the same relation to the reading course as that borne by a school history to a course of historical reading; that is to say, they will furnish a skeleton which must be filled in with flesh and blood and endowed with life, by the absorption and assimilation of many books and by prolonged experience and reflection. You should use the papers of your predecessors as you use other parts of the reading course, taking from them what seems to you excellent, but giving it your own interpretation and your own coloring.

Your theses should not be unduly long. If you have a clear-cut view of what you wish to say, you will be able to say it briefly. This does not mean that you should omit any single *thought* which seems to you of value. Your economy should be, not in thoughts, but in *words*. As a general rule, it is well to avoid long quotations. You will often find a thought which you wish to use, expressed so aptly that its force would be lessened by any change of form. In such a case, quotation is not only permissible but in all ways desirable. But such quotations are usually brief.

* * *

You will find some terms in current use at the College which call at least for passing notice, because they stand for principles

which are fundamental in our teaching and because, also, the meaning assigned them here will not be found exactly duplicated in any dictionary. Such a word is "doctrine." A purist might well object to the meaning assigned this word in our vocabulary. I shall not take time to discuss this phase of the matter, but will try to make clear to you just what a doctrine is, in the War College sense. A common and convenient way of leading up to the definition of a term is to begin by showing that we have something in mind for which a term is needed. In other words, we build up a *meaning* and then attach a name to it. You will find in the College papers on the Estimate of the Situation and the Order Form, a full discussion of the various sources to which an officer charged with the execution of a task may look for guidance. He may have perfectly definite orders from which there is no occasion to depart. He may be in the presence of a higher authority to which he can look at any moment for new orders. If separated from higher authority, he may still be acting under orders; and those orders, if properly drawn, will include such information of his superior's plans that he can be sure of making his own plans square with them when he finds himself confronted by unforeseen conditions. But let us go one step further and suppose that he has no information as to the general plan, or that the conditions by which he is confronted are altogether different from any which were contemplated by the general plan. Where shall he now look for guidance to make sure of doing just what his superior would wish him to do and just what will fit in with the new plans which his superior will adopt? May we not assume, in the ideal case, a source of information which transcends orders and makes them largely unnecessary? It is said of Nelson, that his captains were so familiar with his views and with the working of his mind that they know instinctively what he would do in any given situation. This evidently does not mean that Nelson had communicated a definite *plan* for every individual situation which could be imagined. It means that he had, if you please, a code, not of rules, but of principles, broad enough to cover all situations; and that his captains knew this code thoroughly. In case of necessity, it took the place of orders, and even of signals; and when Foley cut through the French column at the Nile, he was following, not a signal, but—a *doctrine*. He was "indoctrinated."

A *doctrine* then, may be defined as a general policy outlined by superior authority and communicated to subordinates as a guide which enables them to predict the probable wishes of their superior in cases where a definite statement of those wishes is not available. The subordinates are "indoctrinated" when they have absorbed the doctrine so completely that they apply it instinctively in any given situation where they are obliged to look to it for guidance.

A doctrine, instead of taking its origin solely in the mind and will of the superior, may be evolved from consultation of all who are concerned with it. Nelson never lost an opportunity to confer with his captains, and we may well suppose that the doctrines of the Fleet took shape at those conferences and bore the impress of many individualities. In the end, however, they received their vitality from the will of the supreme authority; so that, while the method of their evolution is a matter of interest, and contains in itself valuable lessons for us, it does not change the fact that, as stated in the above definition, the doctrine represents, in the end, the views and the will of the supreme authority.

Other terms which I might define for you are: "orders and commands," "the area of discretion," "the province of the subordinate," etc. These are not merely *phrases*. They stand for principles, and principles of commanding importance. Obvious as their definitions may seem, they are all charged with lessons which are not apparent at first thought. Some of these lessons will be pointed out in the papers to be read in the near future. Others will come to you gradually as your course progresses. This, indeed, is true of every principle that the College teaches you—its deepest and most valuable lessons will prove matters of slow development, and their value to you will be the greater because you have not seen their full significance at once.

I have said that your contribution to preparedness for war is to prepare yourselves, and that the contribution of the War College is to assist you in this. And I have pointed out certain of the lines along which our assistance is directed. These lines all tend toward the widening of your intellectual horizon. I should do scant justice to the ideals of the College if I failed to point out that it aspires to do more than this. It recognizes in fitness for leadership something which dominates the intellectual as pronouncedly as the intellectual dominates the material, and holds it true to the path marked out by loyalty. This something is mani-

festly a matter of character; and while it is hardly to be hoped that the ideals and traditions of the College can greatly modify the character of those who come under its influence for a period so short as that covered by our course, the privilege is ours at least to indicate the path which leads to military efficiency through the development of military character.

The basis of military character is loyalty; not loyalty which expresses itself in a slavish acceptance of the views of those above us so long as the door remains open for a proper expression of differing views. Constructive criticism may be the highest manifestation of loyalty. But criticism, to be constructive, must find its object in the plan proposed, not in the authority proposing it. This distinction is too often overlooked. I ask you to keep it in mind. You will find in it, I believe, a justification for honest differences of opinion between juniors and seniors. But you will find in it also a condemnation of the loose talk sometimes indulged in, which, in expressing dissent from the views of a higher authority, includes the authority itself in the criticism expressed.

Even within the limits of permissible criticism, there is, of course, a marked distinction to be drawn between the plans of a higher authority which have not yet crystallized in orders, and those which have so crystallized. From the moment when orders are received, loyalty finds its only expression in obedience. But here there enters into the matter another element which we call "initiative"—the element which, when we find ourselves confronted by conditions unforeseen when our orders are issued, not only permits us, but requires us, to depart from the letter of the orders if this is necessary for compliance with their spirit.

You will see, when you become familiar with the spirit of the order-form, how obedience, which we commonly think of as one of the homely virtues, gains in vitality and charm, when we view it in the light of initiative. In this light we see ourselves as partners in the general scheme, contributing our share, not blindly, but intelligently, toward the success of the scheme as a whole; sharers with our leader in the conception of the plan as well as in its execution.

I like to believe that as the ideals of the College become clearer to you, your own ideals will clear up also; that loyalty, which means much to you now, will mean more; that initiative will take its proper place, with its proper limits, in your conception of

obedience; that obedience itself will become a matter, not of obligation, but of instinct;—that, in short, those elements which go to the building of an ideal military character will every one take on a new significance to you, and every one become more intimately a part of yourselves, with every day of your stay at the War College.

There has been much talk of late about co-ordination in the navy, and the lack of co-ordination. Whatever any of us may think about other phases of this matter, no one can doubt that co-ordination is assured between the War College and the Service, who notes the character of the class which graduated here two weeks ago and that of the class which comes to us to-day—most of its members directly from the Fleet, all of its members looking to their course here as a preparation for service *in* the Fleet.

Once more I welcome you to the War College, and once more I ask you to remember that the line which separates you from the staff of the College is very lightly drawn—that we are all students together, traveling the same road, seeking the same end. If it is true, as we believe, that we have something to give you, it is equally true that you have something to give us. You bring to our work a fresh point of view, and a critical one. I believe there is nothing that we need more. We look to you, then, to keep us from becoming academic; to bring into the College the spirit of the fleet; just as, later, we shall look to you to carry out into the fleet the spirit of the College.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE SUBMARINE: ITS PURPOSE AND DEVELOPMENT

By THOMAS A. KEARNEY, Lieutenant Commander, U. S. Navy

A ripple on the water—a long white path of air bubbles, coming nearer and nearer—a muffled explosion—a wounded, sinking ship—the confusion of calamity—then the void of nothingness, upon the face of the waters, save wreckage and drowning men!

A mystery is frequently a thing of creative imagination, an object or happening enshrouded in the figurative fog of ignorance, a something that we don't just quite understand, a performance seemingly supernatural. The unseen, hidden monster of the deep; man's own contribution to the many destructive agencies of old Ocean, the mysterious submarine, has begun its work. And yet, is this really a mystery? Until quite recently perhaps but few of us knew that there was such a thing as a submarine. Even now, how many of us know just what a submarine is? How many have even the faintest conception of its field of operation, its purpose of being, and its capabilities and limitations? The seemingly impossible of yesterday has become the reality of to-day. The machinations of war find revelation, in part, in the destructive work of the submarine. A submarine, or submersible—for the words are frequently used in a synonymous sense—is a peculiar and distinctive type of war vessel, designed with a view to its ability to cruise either upon the water or under the surface of the water. As a fighting craft, its own particular field of action is under water; its offensive weapon, the torpedo.

The objective of submarine warfare has, from its earliest conception, remained consistently the same. The means unto the end alone have changed. When fighting ships were built of wood, the submarine sought to destroy them by taking up a stationary submerged position in contact with the bottom of the enemy's ships and there endeavoring, by means of a boring bit or augur, to drill holes through the planking, and so scuttle them. Another

mode of attack was to secretly cut the anchor lines and trust to the wind or tide to drive the objective vessels ashore, or, having set them adrift, trust to their colliding with other vessels. Later, with the increased use of gunpowder and the development of the mine, we find the submarine endeavoring to attach explosive mines or tanks containing gunpowder to the under-water body of the ship to be destroyed. The procedure was, in some respects, similar to the earlier scuttling enterprises, inasmuch as it was necessary to fasten a screw or hook in the bottom of the ship, to which a line was attached for the purpose of holding the mine in place until such time as the submarine could withdraw to a point of safety and the clock-work mechanism explode the mine. These mines were carried on the outside of the submarine and possessed sufficient buoyancy to insure their floating up against the bottom of the vessel to which they had been fastened.

Manifestly, these operations were both primitive and cumbersome, and depended for their success upon the opponent vessel being at anchor in a roadstead free from any tidal current, for we must not overlook the fact that the motive power of the earlier types of submarine was comparatively insignificant.

With the introduction of sheathing as an under-water covering for the hulls of ships, and later the building of iron ships, the days of augur-boring passed away, and to meet these new conditions it became necessary for the submarine to adapt itself to the use of the so-called spar torpedo—in reality nothing more than a projecting pole or spar having a detonating mine case, containing a gunpowder charge, on its free end. The attack shifts from the under-water to the awash condition, the point and depth of impact being determined by lowering the spar, and the explosion being automatically produced by the force of contact.

Further advances in submarine warfare were made practicable by the improvement in engines and the adoption of the locomobile torpedo as the destructive agent, making it possible to return to the submerged condition and the under-water attack, and permitting of this attack being delivered at a moving target, and from a distance dependent upon the radius of action of the torpedo.

While casual research in any well equipped reference library will reveal a surprising amount of general information relative to the development, construction, and use of the submarine,

the more diligent inquirer finds the detailed knowledge that he would obtain closely guarded in some confidential archive. National governments seem to be actuated by the same common impulse, for each guards with the utmost sedulity the secret details of its submarine construction, and the results of its practices and experiments in the field of subaqueous navigation. For obvious reasons the lay reader must be satisfied with but a general knowledge of these seemingly mysterious engines of destruction —the A, B, C's, we might say, of their being.

Contrary to the accepted and prevailing belief of the present day, the attack under water, or below the water-line, has been practiced in naval warfare for many centuries. The ways and means have varied, but the end sought in each and every attempt has been to surprise and destroy, without injury to oneself, the vessels of an enemy. Submarine warfare knows no middle ground.

To an Englishman, William Bourne by name, and a seaman gunner by early training, must be accredited the authorship of the first comprehensive description of the essential characteristics of an under-water boat. His book, "Inventions or Devices," published in 1578, contains the following very interesting account of his design; and as it has been repeatedly quoted, it merits, in view of the subsequent developments and constructive attainments, our careful reading.

It is possible to make a shippe or boate that may goe under the water unto the bottome, and so to come up againe at your pleasure. Any magnitude of body that is in the water, if that the quantity in bignesse, having alwaise but one weight, may be made bigger or lesser, then it shall swimme when you would, and sink when you list; and for to make anything doe so, then the jointes or places that doe make the thing bigger or lesser, must bee of leather; and in the inside to have skrewes to wind it in and also out againe: and for to have it sinke, they must winde it in to make the thing lesser, and then it sinketh unto the bottome: and to have it swimme, then to winde the sides out againe, to make the thing bigger, and it will swimme according unto the body of the thing in the water.

And to make a small shippe or barke, or boate, do this, the barke being made of purpose, let there be good store of balast in the bottome of hir, and over the balast, as lowe as may be, let there be a close orloppe, such a one as no water may come into it, and then in like manner, at a sufficient height, to have another close orloppe, that no water may come through it; and that being done, then bore both sides full of holes between the two close orloppes; and that being done, then make a thing like the side of the barke or shippe, that may go unto the side of the shippe, the one

for the one side and the other for the other side, and that must be made so close and tight, that no water may come through it: and that done, then take leather, and that leather must bee nailed close, with such provision that no water may soake through it, and to be of that largenesse, that the thing may goe close unto the barke or shippe side when you would and come in againe, to let sufficient water in, that it shall not be able to swimme. And now, this being done, you must make provision of skrewes, or other engines, to winde the two things on the inside of the barke or shippe, that you may winde them in or out at your pleasure: and that done, then for the hatch or skotel, that you must goe in or out, you must have leather round about it, that you may bring that together as a purse mouth, and so with a small skrewe, you may winde it so close together, that being in the bottome of the water, there shall no water come in: and that being done, then you must have one mast, that must be of sufficient biggnesse, that it must have hole bored through the one unto the other, as a pompe hath: and that done, then when you list to sinke, then you must sound the deepness of the water, and foresee that the water will not rise higher than the top of the mast, for the hole that goeth through the mast must give you ayre, as men cannot live without it: and when you would sinke, then with your skrewes winde the two sides inwardes, and water will come into the holes, and so the shippe or barke will sink unto the bottome, and there it may rest at your pleasure: and when you would have it swimme, then with the skrewes winde out the things on both the sides, and that will thrust the water out againe at the holes, and so it will rise and come up above the water and swimme as it did before.

Transposed into the technical phraseology of to-day, Bourne's description would contain such words as "ballast tanks," "Kingston valves," "force and drainage pumps," "buoyancy," and "stability."

From the days of the sixteenth century on down through the years to the present time, submarine construction and navigation have passed through various stages of development. Meeting with but little encouragement, frequently disheartened by casualty, or fatality, inventors and constructors have, however, been tenacious and persevering in their efforts, and have at last given to the navies of the world a "shippe or boate that may goe under the water unto the bottome and so come up againe at your pleasure." It is not, however, the intent of this article to trace in detailed chronological order the interesting story of the evolution of the submarine, or submersible boat. The story in its entirety is closely intermeshed with the evolution of the mine, the torpedo, mechanical propulsion, electricity, gas and oil engines, optics, chemistry, and a score of other equally important scientific subjects.

Of the early American inventors, particular mention must be made of the work of David Bushnell, and of Robert Fulton, both having been termed, by their respective enthusiastic admirers, the "Father of the Submarine"—a title claimed also for Cornelius Van Drebble, for, according to the "Chronicle of Alkmaar," a Dutch work published in 1645, Van Drebble had "built a ship which one could row and navigate under water . . . . even five or six miles, or as far as one pleased."

Bushnell's boat was completed about 1775-1776, and was much in advance of anything in its class at that time. Lieut. Colonel Cyril Field, Royal Marine Light Infantry, in his interesting "Story of the Submarine," quotes the following description of Bushnell's "turtle," from the *Britannic Magazine:*

The inside was capable of containing the operator and air sufficient to support him for thirty minutes. At the bottom, opposite the entrance, was fixed a quantity of lead for ballast. At one edge, which was directly before the operator, was an oar for rowing forward or backwards. At the other edge was a rudder for steering. An aperture at the bottom, with its valve, was designed to admit water for the purpose of descending; and two brass forcing pumps served to eject the water within, necessary for ascending. . . . . A water gauge or barometer determined the depth of descent; a compass rendered visible by means of phosphorus directed the course, and ventilators which, when submerged, were closed by the pressure of water, at once admitted a fresh supply of air the moment the top of the boat appeared above water. When the navigator would descend, he placed his foot on the top of a brass valve, depressing it, by which he opened a large aperture in the bottom of the vessel through which the water entered at his pleasure; when he had admitted sufficient quantity . . . . and obtained an equilibrium, he could row upwards or downwards or continue at any particular depth with the oar placed near the top of the vessel and formed like a screw. The bottom of the vessel was made exceeding strong; and to strengthen it as must as possible, a firm piece of wood was framed parallel to the conjugate diameter to prevent the sides yielding to the great pressure of the incumbent water during a deep immersion. On the fore part of the brim of the crown of the machine was a socket and an iron tube passing through the socket; the tube stood upright and could slide up and down in the socket six inches; at the top of the tube was a wood screw, fixed by means of a rod which passed through the tube and screwed the wood screw up against the bottom of the ship, and turning at the same time, it would enter the planks; when the wood screw was firmly fixed it would be cast off by unscrewing the rod which fastened it to the top of the tube. Behind the submarine vessel was a place above the rudder for carrying a powder magazine, large enough to contain 150 pounds of powder, with the apparatus used in firing it, and was secured in its place by a screw. A strong rope extended from the

magazine to the wood screw above mentioned. When the wood screw was fast in the ship, both it and the powder case were cast off from the boat, and the latter, being constructed so that it was lighter than water, rose up against the bottom of the ship to be destroyed. A clockwork apparatus was set in action at the same time and exploded the charge after a sufficient interval. The skillful navigator could swim so low on the surface of the water as to approach very near to a ship in the night without fear of being discovered. He could sink very quickly, keep at any depth, and row a great distance in any direction without coming to the surface; and when he rose he could soon obtain a supply of fresh air, when if necessary he might descend again and pursue his course.

During the Revolutionary War this boat engaged in two attempts to destroy British vessels at anchor in the Hudson River. In the first of these expeditions the navigator successfully placed the boat under the British ship *Eagle* without detection, but was unable to attach the mine.

The inclusion of the detachable mine or explosive case, together with the use of the propeller—for such was undoubtedly the "oar formed upon the principle of the screw fixed in the fore part of the vessel"—marks a distinctive advance in the construction of the submarine, and forms, in part, the basic principles of the present-day submarine. The detachable mine or gunpowder case has given way in the march of progress to the mobile torpedo with its gun-cotton explosive; the clock-work of the mine has been superseded by the automatic detonator of the torpedo; and the "oar formed upon the principle of the screw," actuated by hand or foot power, is the machine-driven propeller of to-day. Steam, explosive oils, the internal combustion engine and the electric storage battery have supplanted man power.

Fulton's ventures into the realms of submarine design and construction took tangible shape about 1800, when the French government built, in accordance with his plans, a submarine called the *Nautilus*, to be followed shortly afterwards by a second and more pretentious boat of the same name. These boats differed in shape from the Bushnell "turtle," and resembled in a manner the boats of the present day, in that they were more or less circular in shape in their amidship cross-section, and longer in their fore-and-aft direction. Comical as it may now seem, Fulton's boats were provided with a folding mast and sail for surface work. Later, both England and the United States carried on experimental work with Fulton's boats under his personal supervision, but there is no record of any marked achievments.

The biographies of the earlier submarine inventors reveal the rather unusual fact that few, if any, of them were seagoing men, familiar with nautical practices or versed in the intricacies of shipbuilding. Fathers Mersenne and Fournier belonged to a religious order; Criminius was a Jesuit priest; Nathaniel Symons was a carpenter, of Harbeston in Devonshire; Day was a Suffolk wheelwright; Jules Fabre was a professor at the University of Aix; Lodner Philips was an American shoemaker; Wilhelm Bauer was a soldier; and yet, through their painstaking and persevering efforts, the way was cleared for such inventors as Peral of the Spanish Navy; Drzewiecki of Russia; Holland, Baker and Lake of the United States; Nordenfeldt of Sweden; Campbell, Ash and Waddington of England; Goubet, Zedé and Laubeuf of France; and Pullino of Italy.

Distinctive epochs have clearly marked the progress of submarine design, and one of the most important determining factors has apparently been the propellant agency. In the beginning, hand power was applied direct to oars, sweeps or paddles; next came the indirect application of hand power by means of cranks and gearing, to bucket wheel, spiral screw and propeller. It was not until the advent and application of the steam engine that any distinctive advance was made.

An early example of the application of steam as a motive power is to be found in the so-called "*Davids*" of the Southern Confederacy, a name suggested by the Biblical story of the conflict between David and Goliath; for it was contemplated in this instance that the small, improvised and comparatively insignificant vessels being built by the Confederacy would be able to destroy, by means of their torpedoes, the larger and more powerful blockading vessels of the United States Navy. Strictly speaking, these boats were submergers, rather than submarines, depending as they did for their defense and immunity upon their ability to submerge by the introduction of water ballast to an awash condition, thus reducing their target area to a minimum. As a rule, they were cylindrical in shape, hand crank or steam-propeller-driven, and were fitted with the so-called spar torpedo; *i. e.*, a long pole or spar, hinged over the bow and carrying at its forward end a metallic case containing gunpowder, which was exploded under water when in contact with the opposing vessel. The success of this mode of attack depended upon the ability of the *David* to approach

to a point of actual contact with her opponent; in consequence, her operations were carried on under cover of darkness and against an anchored or stationary blockading vessel. A primitive vessel of this class, dependent upon a hand-driven propeller, successfully torpedoed and sank the U. S. S. *Housatonic* off Charleston, S. C., in February, 1864. The *David* and her entire crew were lost.

Le Plongeur, of the French Navy, launched at Rochefort in 1863, was fitted with a new type of engine driven by compressed air carried in suitable storage tanks. Like the *Davids,* her aggressive activities were restricted to the limitations imposed by the use of the spar torpedo.

Steam, as a motive power for both surface and under-water cruising, was used by Garrett, about 1879-1880, in a submarine known as the *Resurgam.* When cruising on the surface, a boiler fitted with a short funnel or stack, exhausting into the atmosphere, supplied the necessary steam for operating the engine, which in turn rotated a screw propeller attached to a shaft protruding through the after end of the boat, in the line of the fore-and-aft axis. To cruise in the submerged or under-water conditions, recourse was had to the storage of latent heat, in a number of hot-water tanks built into the vessel; this arrangement gave but a limited cruising radius under most favorable conditions, and involved the rather tedious operation of heating up the water and the subsequent closing or sealing up of the boiler and its gases of combustion before the boat could submerge.

About 1885, Nordenfeldt, prominently identified with ordnance work, became deeply interested in submarine construction, and produced several fairly successful boats. His most notable contribution to the advancement of submarine design was the adoption of a device for carrying and discharging the locomobile torpedo. His first boat, referred to as the *Nordenfeldt I,* built in Sweden and afterwards sold to Greece, was fitted with an external bow tube adapted to the use of the Whitehead torpedo. A later boat, built in England and tentatively purchased by the Russian government, was the first submarine to be fitted with the internal torpedo tube, a discharging device incorporated in the bow structure of the vessel.

At about this same period, Spanish, English and French inventors produced boats of the electric-drive type, their surface and

under-water motive power being furnished by electric accumulators.

Desultory attempts had been made during the period 1861-1885 to adapt various propelling powers to submarines, but the results were not satisfactory. Alstitt, an American, in a boat built at Mobile about 1863, attempted the use of the steam engine for surface cruising and electric motors for use when submerged. Holland's second boat, built in 1877, was fitted with a small gas engine, driving the usual screw type of propeller. Tuck, another American inventor, resorted to the use of the so-called "fireless engine," heat sufficient to generate steam being provided by the use of sodium hydroxide.

With the final adoption of the gas engine for surface work, followed later by the heavy-oil or internal-combustion engine, and the use of the electric storage battery for sub-surface work, this feature of submarine construction is brought up to the present day. The details of application vary in accordance with the ideas of the individual builder, but the basic principles seem much the same in all the later types of serviceable boats.

Years ago in eastern waters one frequently noticed on the bows of Chinese war junks elaborately painted human eyes, one on each side, and inquiry revealed the fact that they were put there that the boat might see where it was going—"No got eye, how can see? No can see, how can go?" Simple and childlike as this belief may seem, it becomes an actuality when applied to a vessel traveling under water. The submarine must see at times; and to meet this requirement, an optical instrument known as a *periscope*, or *omniscope*, has been fitted. It consists, essentially, of a vertical cylindrical tube containing reflecting prisms and lenses, so arranged as to permit an observer in the interior of the boat to view objects on the surface. The upper end of the periscope projects above the water when the hull of the boat is completely submerged, yet held in a position near the surface. Its lower end, or eye-piece, terminates in the conning-tower, or control station. A deeper submergence precludes the use of the periscope and removes all signs of the vessel's presence.

Of equal importance with the provisions for structural integrity, and a safe and continuous operating control, are the requirements for adequate ventilation; for upon the supply of respirable air depends the habitability of the submerged vessel. The air con-

tained within a submarine is vitiated by the impurities thrown off in respiration and by the bodies of the operating crew. It contains at all times an excess of moisture. In addition, it is contaminated by the chlorine and other poisonous gases that may be thrown off under certain adverse conditions by the electrical storage batteries; by gasoline fumes and the fumes and smoke incident to gasoline combustion, or the burning of lubricating oils; and by the presence of explosive gases due to gasoline leakage. When trimmed for surface work, these conditions are counteracted by suitable ventilators, open hatches, and electric fans, all tending to produce air circulation. Conditions and requirements become more difficult and exacting when the boat is closed and sealed, and engaged in under-water work. For short cruises, compressed air carried in storage tanks suffices for all additional purposes of supply; but for protracted periods of submergence this will not answer all requirements, and in consequence much consideration is being given to the subject of air purification and re-oxidization, and to the development of an instrument or apparatus capable of readily and promptly indicating the presence or formation of noxious gases.

The submarine, considered as an under-water vessel, may be said to be wholly dependent upon her torpedoes for her aggressive and offensive activities. Used as a ram, this class of boat might, if sufficiently stiffened forward, be capable of sinking an opposing vessel, but this would be done at the almost inevitable cost of self destruction—the attempt might well be classed as suicidal. Torpedo limitations are undergoing constant change and improvement; larger torpedoes bring with them greater speed, longer range, increased accuracy, and a correspondingly larger charge of gun-cotton. In addition to their torpedo equipment the later and larger type of submarines are now provided with small calibre rapid fire guns carried on a specially designed housing mount. This additional armament tends to bring the submarine into the field of surface cruising craft.

As a war craft in the broader sense of the word, its classification is determined by such factors as size and displacement, surface and under-water speeds, bridge and deck arrangements, cruising radius, sea-keeping qualities. Briefly, we may say that three classes are in active service at this time: harbor-defence, coast-defence and seagoing craft.

In shape, the modern and accepted form of submarine boat resembles, somewhat, the right whale—the forward part being somewhat round and bluff in appearance, increasing in size toward the middle or belly section, then gracefully tapering toward the after-body or tail. This comparison may be carried still further if we will liken the screw propellers to the flukes or the tail of the whale. In cross-section, the submarine boat may be said to be more or less circular in shape.

Successive submarine designs have shown a consistent and gradual increase in size, displacement, speed and seagoing qualities. Whereas the earliest boats were of but a few tons displacement and the so-called harbor- and coast-defense boats rarely exceed 200 tons in their displacement, the modern seagoing, seakeeping submarine has attained a size of 800 tons. From comparatively negligible speed, the design requirements now contemplate from 10 to 25 knots per hour when traveling on the surface. The earlier cruises were measured in hours; while a cruise involving days and a couple of thousand miles upon the surface is not an unusual performance for the modern boat.

Submarines, on account of their size, limited facilities, and exacting conditions, are dependent in part upon what is known as a "mother boat" or "tender"—a vessel possessing adequate storerooms, repair-shop facilities, commissary arrangements, hospital quarters, and such other features as are essential to the welfare and comfort of the submarine personnel. Two such vessels, especially designed for this service, are now under construction for the United States Navy. These new tenders have been named the *Fulton* and the *Bushnell*, in recognition of the valuable submarine work of these two American inventors.

Especial interest should attach to the following opinions, which are quoted without comment other than due acknowledgment of their origin:

F. Von Bernhardi, in "Germany and the Next War":

We must also devote our full attention to submarines, and endeavor to make these vessels more effective in attack. If we succeed in developing this branch of our navy, so that it meets the military requirements in every direction, and combines an increased radius of effectiveness with increased speed and seaworthiness, we shall achieve great results with these vessels in the defense of our coasts and in unexpected attacks on the enemy's squadrons. A superior efficiency in this field would be extraordinarily advantageous to us.

C. de Grave Sells, in the 1913 edition of Jane's "Fighting Ships":

> It is but a few years since that the submarine was looked upon merely as a possible means of coast defense and of guarding estuaries, having more or less the advantage of a floating mine and without its drawbacks. But, owing to the development of the submersible, it is indeed to-day a force to be reckoned with, and this not only as a means of defense to be overcome, but a really powerful means of attack to be seriously guarded against.

A delineation of the essentially technical features of submarine construction and operation have purposely been avoided. A comprehension of their intricate details would carry us far into the realms of hydro-mechanics, dynamics, naval architecture and mechanical and electrical engineering, and would entail a comprehension of much that pertains to structural strength of materials, pressures, stability, displacement, buoyancy, and the many laws of applied mechanics—to say nothing of such purely professional subjects as navigation, seamanship, naval tactics, ordnance and gunnery.

For equally cogent reasons a discussion of the tactics of submarine attack or defense, the military place and value of this type of vessel, and the probable influence of present-day activities upon future building programs, is not permissible. It is but natural to expect certain changes in future designs—whether these changes are to be confined to one or more of the component features of any one type of vessel, or are to be broader, more far reaching, and include even the type itself remains to be seen. The evidence at hand would seemingly warrant the abandonment of both the torpedo-boat and the destroyer; and the immediate and further development of the submarine and the scout cruiser; combining in the submarine all of its own characteristics with the essential torpedo features of both the torpedo-boat and the destroyer; and building into the new scout all the speed, sea keeping qualities and gun features of the present scout and destroyer.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SOME NOTES ON BOILER DESIGN[1]

By LIEUTENANT W. P. BEEHLER, U. S. Navy

In spite of the fact that the present types of marine boilers have been in service for a great many years, comparatively little scientific information has been available regarding the transmission of heat through the heating surfaces of these boilers and the manner in which such heat transfer could be rendered more efficient. It has generally been conceded that the tubes should be kept clear of soot and dirt accumulations on the gas side and scale and corrosion on the water side; but information regarding improvements in *capacity*, economic steaming rates and heating surface efficiencies are lacking. Some study has been made of furnaces and methods of firing, together with the intelligent application of the results of flue gas analysis, all of which has resulted in increased boiler efficiency. This is natural since any increase in the furnace efficiency and consequently of heat available for absorption is certain to increase the over-all efficiency; but one point seems to have been overlooked in these investigations, namely, the increase of heating surface efficiency by the use of high gas speeds. If such high gas speeds can find a practical application with high furnace efficiency it is certain that greater boiler efficiencies will result, with a consequent saving of weight and space of incalculable value to a man-of-war.

A number of experiments have been made from time to time to find a relation between heat made available for absorption and heat absorbed, but without success, until a law was evolved by Mr. H. P. Jordan based on the theoretical assumption made by Prof. Osborn Reynolds some 50 years ago. It has remained, however, for Dr. C. E. Lucke to show how such laws may be applied

[1] Notes on a series of lectures delivered by Dr. C. E. Lucke before the Post-Graduate School of Engineering, and some practical applications of these theories.

to present-day boiler design and operation, and where improvement may be made. The writer here has merely tried to show the line of reasoning followed by Dr. Lucke in his deductions and show how his theoretical assumptions have been corroborated and substantiated by Professor Nicolson in his attempt to improve boiler efficiencies by the use of high gas speeds.

HEATING SURFACES

I. ABSORPTION OF HEAT BY HEATING SURFACES

A metal tube containing water flowing in it and having hot gases passing on the other side results in the formation of a thin film of gases on the gas side of the tube and a thin film of water on the water side of the tube, as illustrated in Fig. 1.

FIG. 1

These films of gas and water are the result of friction; that is, they are caused by a rubbing off of particles of gas on the tube on one hand and particles of water on the other hand.

From the Smithsonian Physical Tables it can readily be shown that, taking a value of unity for the resistance of the metal to the flow of heat, the resistance of the water film will be measured as some hundreds while the resistance of the gas film will be some thousands. It is evident, therefore, that of the three resistances encountered in the flow of heat from gas through the tube to the water, this gas film offers by far the highest resistance. In these considerations, it is assumed that the tubes under discussion are free from dirt and soot deposits. From this it is evident that the controlling factor lies on the gas side and that to obtain greater heat absorption by the heating surfaces the controlling resistance must be diminished. Practically, this can be accomplished only by increasing the speed of the gas which, according to Dr. Lucke, rubs off some of the gas film and, according to Professor Nicolson,

results in a scouring action along the tubes. In either case, however, the result is to diminish the thickness of this gas film and hence to cut down the resistance offered to the flow of heat from gas to the metal. In like manner, the thickness of the water film on the water side of the tube may be reduced by increasing the circulation. However, it is evident that, since the controlling resistance lies on the gas side of the tube, no increase in efficiency is to be expected if the circulation alone is increased; that is, without cutting down the thickness of this gas film. This line of reasoning has been amply substantiated by experiment. A series of experiments were carried out, under the direction of Dr. C. E. Lucke, by Mr. W. D. Monks, of Columbia University, showing conclusively that an increase in the speed of water through the tubes did not increase the rate of heat absorption due to this fact provided the speed of the gas remained constant, thus showing conclusively the existence of this gas film previously referred to. If, however, the gas film is reduced, it is to be expected that a reduction of the water film by increased circulation will result in increased heating efficiency.

The above statement has been given in the form of a law by Mr. H. P. Jordan as follows: "In every case the rate of transmission from hot gases to metal is found to increase with the increase of flow"—and here a most striking relation is demonstrated by an appropriate selection of the prime variable representing the rate of flow. When this variable is taken as pounds of air per square foot of area of air passage per second; the B. T. U.'s per hour per square foot per degree difference of temperature between air and metal the relation is linear and the curve is a straight line. These lines have the equation $U=A+B\left(\frac{w}{a}\right)$, where U=B. T. U.'s per hour per square foot area per degree difference of temperature between gas and metal. w=pounds of air per second, and a=square feet of cross-sectional area of gas passage. A=some constant probably dependent upon the cleanliness of the tube. B=some constant dependent upon air temperature and dimensions of air passage. Thus,

$$B=c+c'q+c''t_m,$$

where c, c' and c'' are constants. q=mean hydraulic depth of air passage=also $\frac{\text{Area of flow of channel}}{\text{Perimeter of cooling surface}}$, and t_m=the arith-

metical mean of gas and metal temperatures. These two equations may be combined as follows:

$$U = A + (c + c'q + c''t_m)\frac{w}{a},$$

or, substituting the numerical values found by experiment, this equation as given by Jordan is,

$$\frac{U}{3600} = .0015 + (.000506 - .00045 \times q + .00000165t_m)\frac{w}{a}.$$

This law may be summarized as follows:

(a) For a constant mass flow; that is, $\frac{w}{a} = c$, the rate of transfer is proportional to the temperature difference directly.

(b) For a given temperature difference; that is, $t_m = c$, the rate of transfer increases with the speed by linear law.

(c) For a given rate of flow and temperature difference, the rate of transfer increases with the value of the temperature.

(d) The rate of transfer depends on the condition of the surface.

(e) The rate of transfer depends on the size of the channel; and the smaller the ratio of $\frac{\text{area}}{\text{perimeter}} = q$, the greater the transfer.

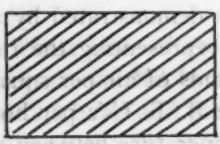


FIG. 3

FIG. 4

From the above, it is evident that q gives a measure of the ability of the gases to get in contact with the heating surfaces. Thus, if a gas passage is square, as shown in Fig. 3, fewer hot gas particles will come in contact with the heating surface as compared with Fig. 4, which has a greater perimeter but the same area. From this, it is evident that some sort of device for mixing gas currents would be useful for bringing more gases in contact with the hot gases of the tubes; but so far it would seem that no practical devices for accomplishing this have been adopted. The best method would appear to be the use of staggered tubes in the gas passage and having the gas passages so shaped that the stream

of gases is broken up instead of flowing in parallel layers, this resulting in a greater number of contacts of hot gas particles with the heating surface in a given length of time. It is also evident that the larger the value of q the greater must be the time of contact of gases or the longer must be the gas passage in order that the same transfer of heat may occur.

2. APPLICATION OF THESE LAWS TO ACTUAL BOILERS

Heat generation is, of course, essential to absorption, but it is necessary to distinguish between an apparent and a real generation; thus, apparent heat generated equals pounds of fuel supplied per hour multiplied by the B. T. U. per pound of fuel as fired. Real heat generated or heat available for absorption is equal to: pounds of fuel supplied per hour $\times$ B. T. U.'s per pound of fuel as fired $\times$ (1 – fraction loss in furnaces).

FURNACE LOSSES

Fuel in the ashes;
Cinders;
Soot discharged through flues;
Unburned hydrocarbons;
Carbon monoxide;
Moistures evaporated.

These furnace losses must be taken into account when the efficiency of the heating surface alone is considered; and in these investigations these furnace losses are charged against furnace efficiency, and remaining heat in the fuel is considered as heat available for absorption.

The heat available for absorption may be absorbed in two ways, namely, by radiation and by conduction. Radiation is not affected by the dead gas film and other resistances that oppose the flow of heat by conduction, and therefore does not depend upon the rate of flow of hot gases. According to the law enunciated by Stefan and Boltzmann, radiant heat absorption is proportional to the difference to the fourth powers of the temperatures of the gases and metals. It should therefore be practically independent of the rate of steaming and depend only upon the amount of surface exposed to such radiant heat.

The absorption by conduction follows the laws formulated by Jordan and should therefore be a linear function. The result,

according to Professor Nicolson, of combining these two factors of heat absorption might be given by an equation in the form of $x^4+bx+c=0$. This equation, which might be solved by trial and error, furnishes a solution for the most economical rate of firing for a good design of boiler. The equation as deduced by Professor Nicolson is not given here in full as this leads to considerations outside the scope of this article.

Applying these two laws to actual boilers, or to actual boiler tests available, these laws are found to hold good in all cases where the tests have been carried out by skilled experimenters and have been of such a duration as to insure accurate results. Plotting B. T. U.'s absorbed per hour per square foot of heating surface

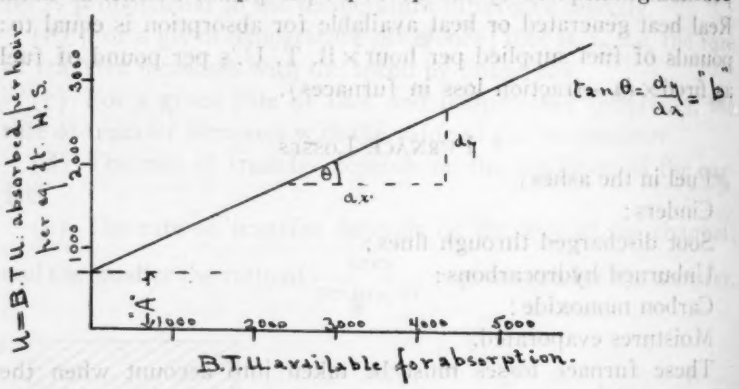


FIG. 5

as ordinates, and B. T. U.'s per hour per square foot of heating surface available as abscissa, the boiler test will yield a series of curves as shown by Fig. 5. These curves are straight lines and have the general equation $U=A+b\times$ (heat available for absorption), where b gives the slope of the curve and A is some constant. The method of plotting these curves from boiler tests will be described in detail later. The intercept A on the y-axis is due to the radiant heat as proved by the fact that boilers having the largest amount of heating surface exposed to this radiant heat give the greater intercepts, and *vice versa*. In the case of the White steam car boiler with no radiant heat the line passes through the origin. The slope of the line, b, would seem to depend upon the mean temperature of the gases and upon the shape of the gas passages, which is in accordance to Jordan's law; that is, it depends

upon the values of q and t_m. Thus comparing heating surface capacity curves of a boiler under coal with those of the same boiler burning oil, it is noted that the radiant heat intercept is less for the oil than for the coal while the slope is greater for the oil than for the coal. This is to be expected, since t_m in the former case is the greater. Other things being equal, the value of q will materially affect the slope of the curve, since this is a measure of the ability of the gases to make contact with the heating surface.

In plotting the curves described above the furnace loss was taken as a constant ratio between the limits of moderate rates of steaming, since in general it would seem that the boilers are designed for their greatest efficiency between the limits of from 20 to 40 pounds of coal per square foot of grate surface per hour. This is in accordance with the law given by Gebhardt for furnace losses. A few numerical values of A and B are given from actual boiler tests:

Boiler	A	B
Locomotive	1450	.66
Heine	615	.51
Stirling	235	.82
White Steam Car	0	.78
Hohenstein	1368	.61
Niclausse	1760	.566
Hohenstein on Denver	1090	.56

CAPACITY OF BOILERS

The capacity is taken as B. T. U.'s absorbed per square foot of heating surface per hour, and in accordance with the laws previously enunciated capacity will equal $A+b\times$(the heat available for absorption). The question then arises as to limitations for this capacity curve. A close study of the boilers now in service indicate that five factors limit this capacity curve in practice and prevent us from obtaining very high rates of absorption. These limits may be summarized briefly as follows:

(A) Local failure of circulating system.

(B) Too little water storage.

(C) Excess moistures or priming.

(D) Efficiency too low beyond a certain limit.

(E) Insufficient heat developed due to: First, to low rate of combustion, and, secondly, to a high rate of combustion with small furnace.

The above are the practical limits to capacity of boilers as designed at present, and if these are overcome the limit may be indefinitely extended, since no matter how high the rate of evaporation goes no injury will be done the metal *provided one side of the metal is kept wet.* This shows that if these limits may be overcome in practice, there are vast possibilities for increased boiler efficiency and higher rates of evaporation than those extant at present. The following table gives an idea of the numerical values of the rated capacity of boilers at present in use:

	Boiler	Capacity
Locomotive Boilers, Fire Tube.	Locomotive, Penn. R. R.	8.55
	DeGlehn	9.04
	Cross Compound	9.78
	Hanover Compound	11.88
	Simple Consolidated	12.05–12.39
	Baldwin Compound	14.11
	Cole	16.34
	Italian Cruiser	20.00
Marine Boilers, Water Tube.	Normand	11.4
	B. & W. (coal)	14.6
	B. & W. (oil)	16.0
	Express	10.0
	Roberts Coil Boiler	12.4
	Hohenstein	16.5
Stationary Water Tube.	B. & W.	10.2 (300 per cent of rated).
	Heine	4.1
	Stirling	7.2
	Cahall	6.6
	Heine	3.7
	Edgemoor	11.0 (5 inch water draft).
	Redondo	6.7
Stationary Fire Tube.	H. R. tube	6.7
	H. R. tube	6.4 stoker fired.
		5.4 hand fired.
	Gunboat boiler	4.0
	Lancashire	11.4 (forced).
	Bone	20.0–40.0

The tables give the limits commonly used in practice but these limits may be greatly extended provided other things are taken care of.

(A) *Local Failure of Circulation.*—This is caused by (1) failure of water to get to the spot, and (2) excess heat locally applied.

Among the remedies which suggest themselves for (2) are: Jacketing of tubes exposed to excess heat or subject to radiant heat; this is impracticable, however, since it deprives the heating surface of the effect of valuable radiant heat. Increasing the supply of water to the spot; this may be done by changing to some extent the circulating system to supply a greater flow of water to the tubes exposed to radiant heat. Insure greater discharge of steam and water from the spot subject to excess heat locally applied; this may be done by altering the shape of the discharge end of the tube, provided always, of course, that this does not interfere with the proper circulation of water. Insure water supply to the tube so exposed in such a manner that no other tube robs it of its supply of water. In the B. & W. boiler this might be accomplished by the use of outside down-takes or down-comers. In general, it might be stated that the steam will be discharged most readily from vertical tubes, and least readily from horizontal tubes, increasing with the increased slope of the tubes to the horizontal. When seeking to increase boiler capacity it is necessary to insure an active circulation and the ready access of water to parts subject to excess local heating together with an easy discharge of steam and water from that tube. The header type of boiler is poorly designed to meet these requirements. Scale will naturally cause the failure in any boiler; hence, when designing for high capacity boilers must be so designed as to permit of ready access for cleaning and for the prevention of scale in the tubes.

(B) *Too Little Water Storage.*—(1) Too little total water. (2) Too little drum water.

Too little total water causes the boiler to be too sensitive to fluctuations, while, on the other hand, too much total water makes the boiler slow to respond to sudden demands for extra steam. The time to evaporate the total water at the designed moderate steaming rates must be taken into account; that is, the time taken to evaporate all the water in the boiler with the feed shut off. Too little drum water will cause surging, and, consequently, the danger of the water level dropping too low. Hence, there must be a sufficient storage of water in the drum to prevent such accidents. When designing for high capacities these points must be carefully considered.

(C) *Moisture.*

Boiler	Equivalent evaporation	Percentage of moisture
B. & W. under coal	4	0
B. & W.	15	.43
B. & W. under oil	4	.11
B. & W. under oil	16	.81
Normand	4	.14
Normand	9.75	.41

From the above it will be seen that in general the moisture increases with the steaming rate, but there is a certain range of steaming rates where the moisture is inappreciable. The practical danger limit for moisture depends upon conditions, but, in general, 1 per cent is the limit. When using high rates of evaporation some control of this moisture is necessary, as it is essential that the machinery be supplied with dry steam.

CONTROL OF MOISTURE

Moisture will depend upon the disengaging surface which controls the velocity of escape of the steam bubbles. Steam bubbles escaping into the steam space at high velocities or at what is called a high disengaging velocity will tend to spatter water all over the steam space and cause such particles of water to be carried off with the steam. Several preventatives suggest themselves as a practical remedy for this priming.

(1) Baffles in the water in order to reduce the velocity of steam bubbles passing through the water. This remedy might be used in boilers where the steam and water are discharged below the water level.

(2) Baffles in the steam space; that is, splash plates for boilers discharging in the steam space above the water level.

(3) Increased steam space.

(4) Extra drums.

(5) Dry pipes.

In general, the disengaging velocity is inversely proportional to the disengaging surface. Thus, a Scotch boiler having as a disengaging surface the entire surface of the water in the boiler should have under normal circumstances a low disengaging velocity, and the same should be the case for vertical water-tube boilers. Boilers having a small steam drum and, consequently, a

smaller disengaging surface, will have a higher disengaging velocity and will, therefore, tend to prime unless some contrivance is adopted to prevent this carrying over of moisture. Another manner of reducing the disengaging velocity is to use increased steam pressures, thus increasing the density of the steam and decreasing the disengaging velocity, since the disengaging velocity = $\frac{\text{cu. ft. per hour}}{\text{disengaging area}}$. In the latter case the specific volume of the steam will be reduced, and a low disengaging velocity will result. The use of high pressure with reducing valve might, therefore, be advantageous under some circumstances, since the wiredrawing through the reducing valve tends to superheat the steam and insure a supply of dry steam to the engines. The disadvantage lies in the increased cost and weight of material necessary to withstand high pressures.

(D) *Loss of Efficiency with High Capacity.*—The absolute limit here is given by the point where any increase in fuel fired results in no increase in the amount of steam formed. This is termed the economic limit of the boiler. It will be seen from considerations taken up later that this limit is set by the furnace alone and that increased efficiency of this factor would result directly from the increase in the furnace efficiency. The above is evident, since the heating surface will absorb a fixed percentage of all of the heat brought in contact with it, other things being equal.

(E) *Insufficient Heat Developed.*—The amount of fuel burned per square foot of grate surface per hour does not necessarily depend upon the draft alone, since certain cases might arise where draft was very high but a relatively small amount of heat is being generated due to improper thickness of the fires. On the other hand, fires might be of a proper thickness but the manner of admitting air to the furnace might result in incomplete combustion of the fuel. Thus it will be seen that the manner of firing and the proper thickness of carrying fires for different rates of steaming and conditions of draft are factors which must be seriously considered when attempting to obtain high efficiencies in any type of boiler. Officers desiring to make a study of the proper methods of carrying fires and burning the coal on the grates, together with the considerations of sizes of furnaces for good combustion of the fuel and high efficiencies, are referred to the most excellent paper recently issued by the Bureau of Mines,

entitled "Factors Governing the Combustion of Coal in Boiler Furnaces."

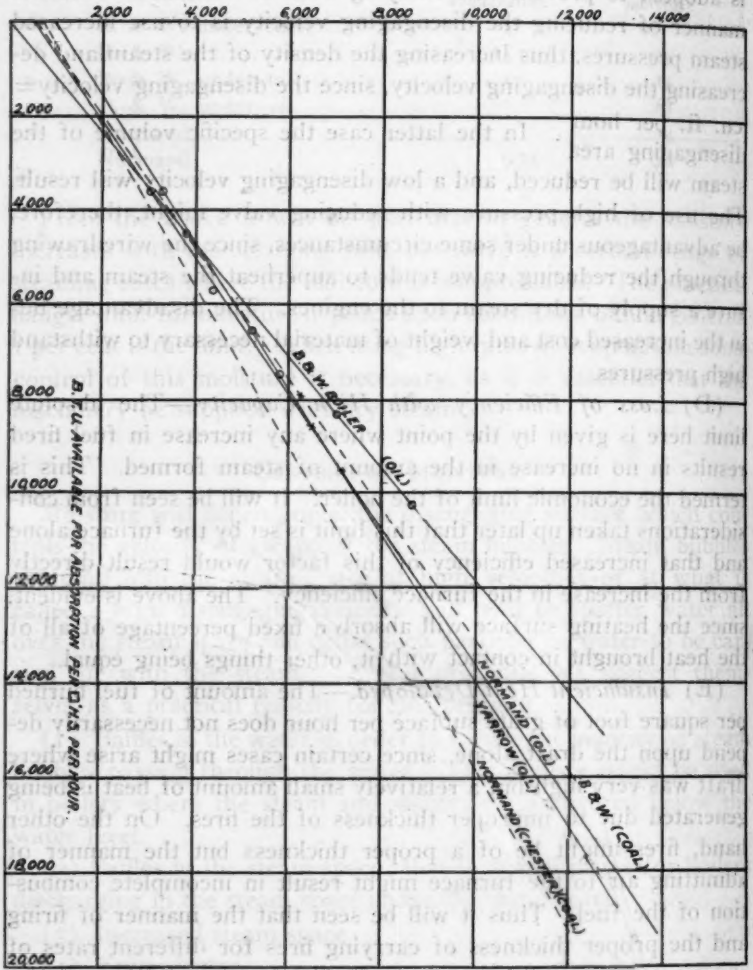


PLATE 1.—H. S. capacity curves

N. B.—B. T. U.'s available = fuel heat × constant % furnace for moderate rates. 5% coal. 2% oil fuel

B. T. U. absorbed per □' H. S. per hour

——— boilers under oil. Tested by the Fuel Oil Testing Plant

– – – – " " coal. Melville Tests

Taking the data from the series of boiler tests a set of curves may be plotted as illustrated in Plate 1. These curves contain no

additional data over those of the test from which they were taken, but when plotted in this manner, illustrate clearly the losses occurring in a boiler. They are instructive in showing how over-all efficiencies may be improved by improving the efficiencies of the heating surfaces and furnaces. It is evident from a perusal of the diagram that the heating surface efficiency will depend very largely upon the slope of the heating surface capacity curves, and we know from Jordan's law that the slope of this curve may be increased by increasing the value of t_m which is the mean temperature difference between gas and metal or, in other words, the temperatures of the flue gases, and also by decreasing the value of q which is the mean hydraulic depth of the gas passage. From this it is evident that high gas speeds with suitably designed areas for gas passage must inevitably result in high heating surface efficiencies and, consequently, in a greater over-all efficiency of the boiler itself. The heating surface efficiency curve is seen to slope down as the capacity increases and approaches, but never crosses, the line marked b to which it is asymptotic, b being the slope of the curve. (Plate 4.) This has been proved to be the case in a series of experiments carried out on an experimental boiler by Professor Nicolson, in which the gas speeds were very high and resulted, according to him, in an average heat transmission of 46,400 B. T. U.'s per square foot per hour, corresponding to an evaporation of about 48 standard units per square foot per hour. This result is very much larger than that usually obtained in practice, but was subsequently confirmed by Mr. Longridge's test on the same boiler. It is interesting to note, also, in connection with these tests that while the temperature of the gases in the combustion chamber was 2600° F. the temperature of the gases after leaving the economizer or the smoke-stack temperature was only 279° F., showing that a relatively large percentage of the heat was absorbed by the heating surface, since the smoke-stack temperature was lower than that usually found in practice.

The boiler used by Professor Nicolson in carrying out his tests was a Cornish boiler arranged as follows:

In the last 10 feet of boiler flue there was inserted a circular brick plug 38 inches in diameter and 10 feet long, having an annular space 1½ inches around it for the flow of gases. The gases then passed into an evaporator—passing along the tubes through which water circulated. The evaporator (16 inches in diameter) contained 90 tubes of ⅝-inch outside diameter, and the

center was filled with a pipe 6 inches in diameter to which the gases had no access. The gases were then forced through an economizer 16 inches in diameter containing 163 vertical tubes of ⅞-inch outside diameter.

The gases were drawn through the economizer and evaporator by high speed fan (1640 r. p. m.).

Thus the areas for gas passage were as follows: Flue 186 square inches. Evaporator 145.5 square inches. Economizer 103 square inches.

In a subsequent arrangement for the tests conducted by Mr. Longridge these dimensions were changed slightly, but the resultant gas speeds were approximately as follows: Flue 79-152 foot-seconds, evaporator 98-152 foot-seconds, economizer 83-152. Thus the gas speeds were increased to about three times those used in present-day practice, reducing the gas film considerably. The water film was reduced by increased circulation in the evaporator and economizer tubes by means of square rods inserted in the tubes, thereby reducing the area for passage of water and increasing the rate of flow of water through them.

On Plate 2 are plotted the results of these tests—showing that when boiler, evaporator and economizer were taken separately the absorption followed the straight line law of Jordan. When plotted altogether there is a slight deviation from the straight line law due to the varying values of q or mean hydraulic depth of gas passage in boiler flue, economizer and evaporator, giving each line a slightly different slope when plotted independently. The result of a test on a good locomotive boiler quoted above is also plotted on this plate for purposes of comparison.

In plotting these curves the furnace losses were taken according to Mr. Longridge's report at about 5 per cent—which is thought to be rather conservative for a boiler using coal. If the furnace losses were greater the slope of the lines would be even further increased, giving a still larger heating surface efficiency.

The heating surface efficiency curves and boiler efficiency curves are shown plotted on Plate 3, being plotted directly from the curves on Plate 2, and Mr. Longridge's tests. These curves indicate that the furnace efficiency was probably assumed a trifle too great, since the over-all efficiency falls off somewhat at higher rates, due to falling off furnace efficiency. This is evident since the over-all efficiency is the product of heating surface and boiler efficiency curves.

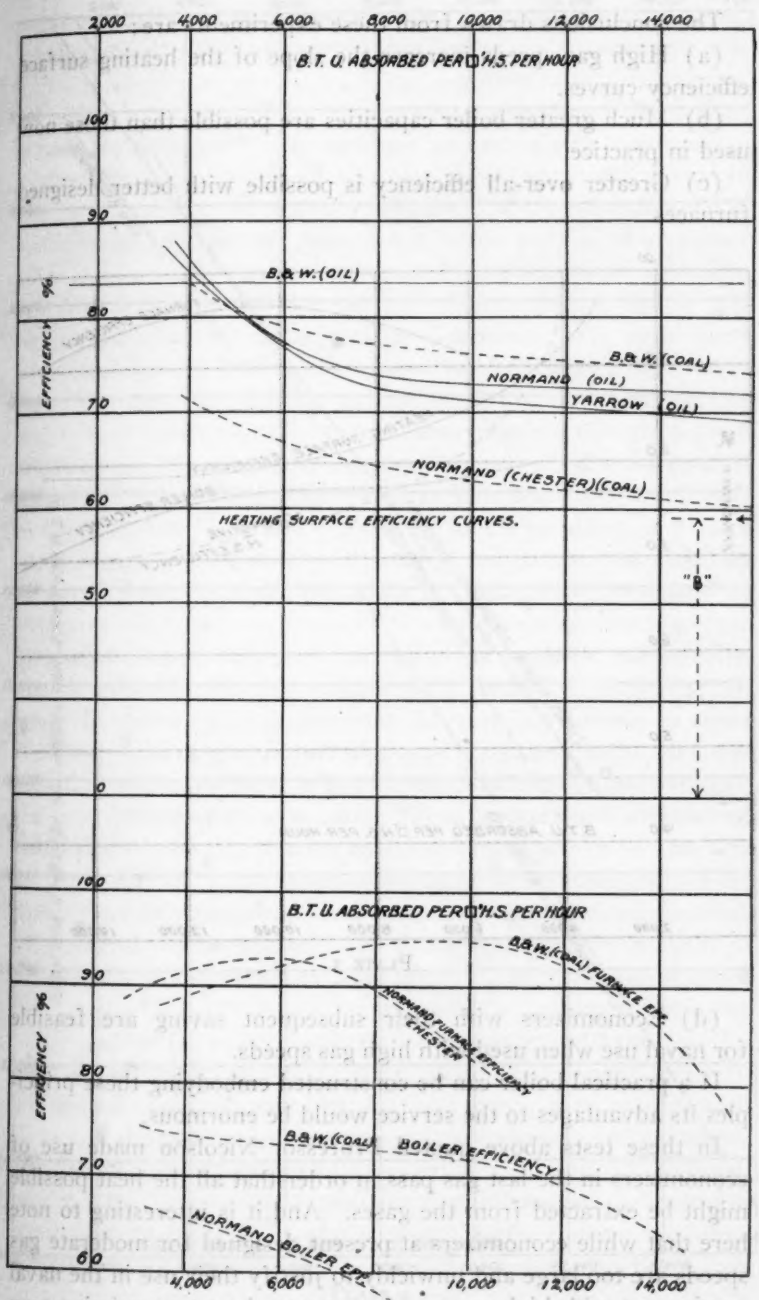


PLATE 2

N. B.—Furnace losses as per data from report of tests. Average 5%

The conclusions drawn from these experiments are:

(a) High gas speeds increase the slope of the heating surface efficiency curves.

(b) Much greater boiler capacities are possible than those now used in practice.

(c) Greater over-all efficiency is possible with better designed furnaces.

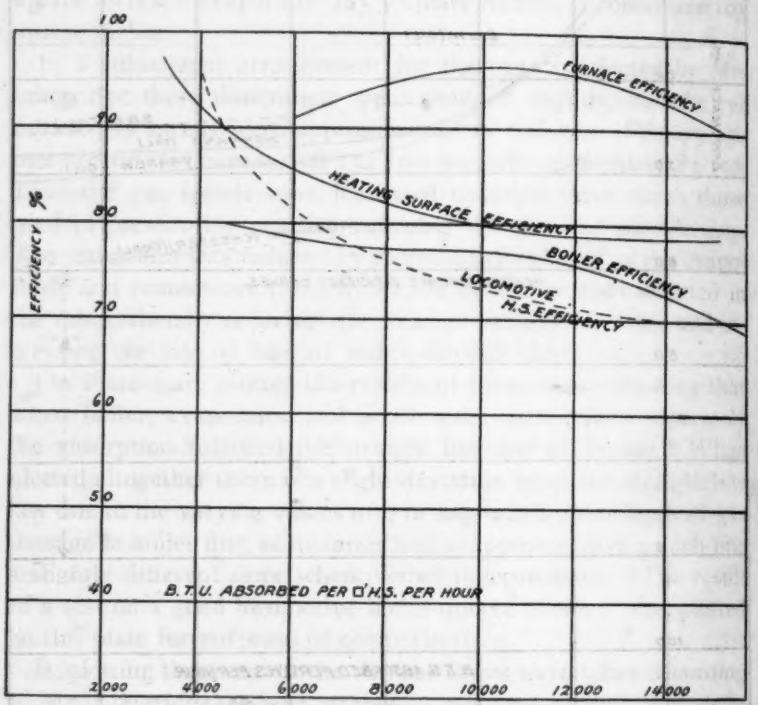


PLATE 3

(d) Economizers with their subsequent saving are feasible for naval use when used with high gas speeds.

If a practical boiler can be constructed embodying these principles its advantages to the service would be enormous.

In these tests above quoted Professor Nicolson made use of economizers in the last gas pass in order that all the heat possible might be extracted from the gases. And it is interesting to note here that while economizers at present designed for moderate gas speeds are too large and unwieldy to justify their use in the naval service, yet with high gas speeds a greater heat transmission may

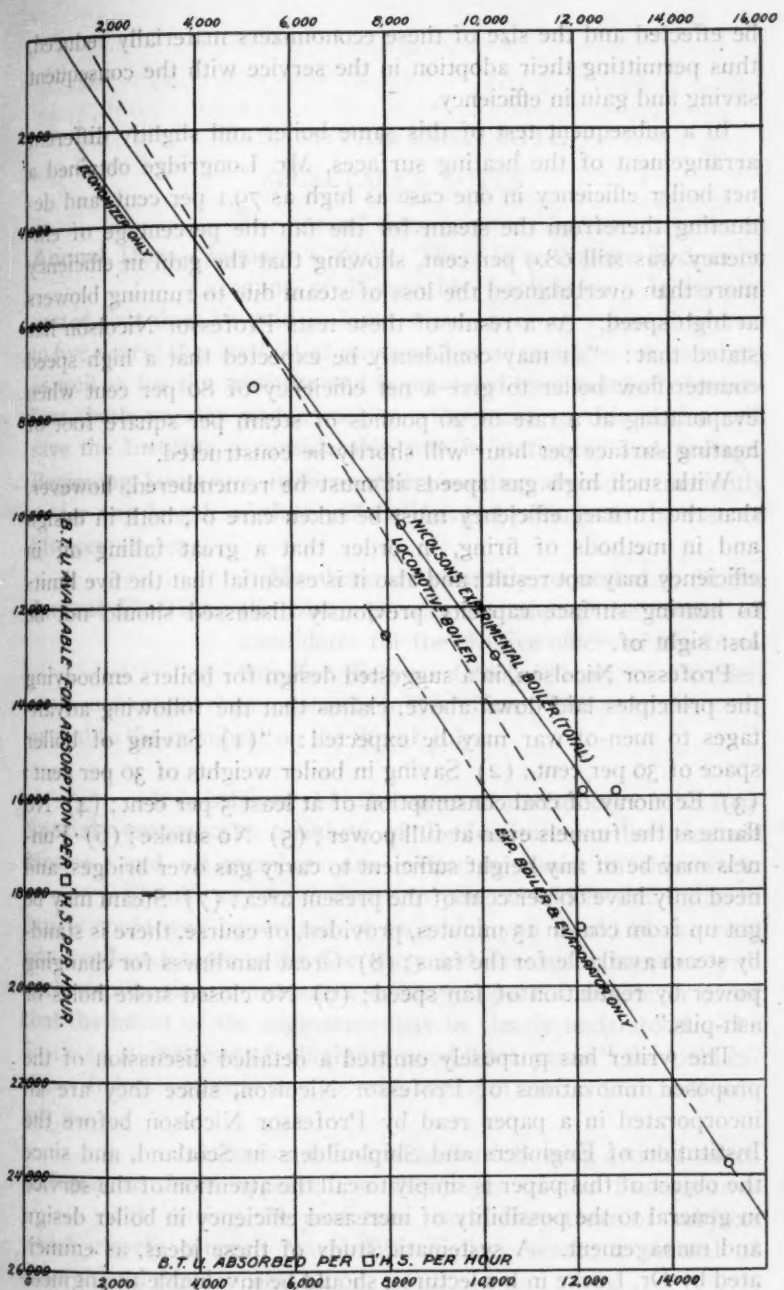


PLATE 4

B. T. U.'s absorbed per □′ H. S. per hour

N. B.—Boiler efficiency = H. S. eff. × furnace efficiency

These curves were plotted from curves on Plate 1 and boiler efficiency data from tests

Heating Surface Efficiency Curves

be effected and the size of these economizers materially reduced, thus permitting their adoption in the service with the consequent saving and gain in efficiency.

In a subsequent test of this same boiler and slightly different arrangement of the heating surfaces, Mr. Longridge obtained a net boiler efficiency in one case as high as 79.1 per cent, and deducting therefrom the steam for the fan the percentage of efficiency was still 68.9 per cent, showing that the gain in efficiency more than overbalanced the loss of steam due to running blowers at high speed. As a result of these tests Professor Nicolson has stated that: "It may confidently be expected that a high speed counter-flow boiler to give a net efficiency of 80 per cent when evaporating at a rate of 20 pounds of steam per square foot of heating surface per hour will shortly be constructed."

With such high gas speeds it must be remembered, however, that the furnace efficiency must be taken care of, both in design and in methods of firing, in order that a great falling off in efficiency may not result; and also it is essential that the five limits to heating surface capacity previously discussed should not be lost sight of.

Professor Nicolson, in a suggested design for boilers embodying the principles laid down above, claims that the following advantages to men-of-war may be expected: "(1) Saving of boiler space of 30 per cent; (2) Saving in boiler weights of 30 per cent; (3) Economy of coal consumption of at least 5 per cent; (4) No flame at the funnels even at full power; (5) No smoke; (6) Funnels may be of any height sufficient to carry gas over bridges, and need only have 60 per cent of the present area; (7) Steam may be got up from coal in 15 minutes, provided, of course, there is stand-by steam available for the fans; (8) Great handiness for changing power by regulation of fan speed; (9) No closed stoke holes or ash-pits."

The writer has purposely omitted a detailed discussion of the proposed innovations of Professor Nicolson, since they are all incorporated in a paper read by Professor Nicolson before the Institution of Engineers and Shipbuilders in Scotland, and since the object of this paper is simply to call the attention of the service in general to the possibility of increased efficiency in boiler design and management. A systematic study of these ideas, as enunciated by Dr. Lucke in his lectures, should be invaluable to engineer officers desiring greater efficiency in the plants under their charge.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Annual Dues

The annual dues for 1915 became payable on January 1, 1915. There is no change in dues on account of bi-monthly publication. It is suggested that dues be paid in lump sums covering a period of two to five years; this method of payment has advantages for members as well as for the Institute and is practiced by a number of members, both regular and associate. Response to this notice will save the Institute a considerable sum in stationery and postage. Beginning January 1, 1916, members residing abroad permanently or for any length of time will be charged postage at the rate of fifty cents a year.

Annual Election

Members are earnestly requested to fill out the blank proxies containing the names of candidates for the elective offices of the Institute for the year October, 1915, to October, 1916, and return them promptly to this office. These proxies were mailed to the members on the 8th of July.

Special Notice

It is believed that the scope of usefulness of the PROCEEDINGS to members of the Institute can be increased and all members are invited to assist in this work. Should any topic occur to you on which you think an article could well be written, or on which you would like to read one, send such topic to the Secretary and Treasurer, together with such explanation or comment as may appear desirable in order that the intent of the suggestion may be clearly understood. The Institute is desirous of obtaining good "sea yarns" for publication. It is hoped that anyone who can spin such a yarn will submit it.

References

Attention is invited to the following articles which have appeared in the pages of the PROCEEDINGS during the past two years; they treat of subjects which closely concern Naval War College work; a perusal of them should prove profitable:

1913

Trained Initiative and Unity of Action: The True Bases of Military Efficiency. By Lieutenant Commander D. W. Knox, U. S. N.; page 41, Whole No. 145, March, 1913.

Logistics: Its Bearing on the Art of War. By Commander C. T. Vogelgesang, U. S. N.; page 63, Whole No. 145, March, 1913.

Column as a Battle Formation. By Lieut. Commander D. W. Knox, U. S. N.; page 949, Whole No. 147, September, 1913.

The Naval War College, the General Board and the Office of Naval Intelligence. By Commander W. S. Crosley, U. S. N.; page 965, Whole No. 147, September, 1913.

Scouting and Screening Operations. By Lieut. Commander W. S. Pye, U. S. N.; page 1139, Whole No. 147, September, 1913.

Organization of the Fleet for War. By Lieutenant R. E. Ingersoll, U. S. N.; page 1739, Whole No. 148, December, 1913.

1914

War and Policy. By Captain J. S. McKean, U. S. N.; page 1, Whole No. 149, June, 1914.

Moral Training in Preparation for War. By Charles M. Bakewell; page 157, Whole No. 149, January, 1914.

The Great Lesson from Nelson for To-day. By Lieut. Commander D. W. Knox, U. S. N., P. E., page 295, Whole No. 150.

Naval Policy as it Relates to the Shore Establishment and the Maintenance of the Fleet. By Captain John Hood, U. S. N., H. M., 1914; page 319, Whole No. 150, March, 1914.

Details of Navy Department Administration: Navy Department Policies. By Lieut. Commander N. L. Jones, U. S. N.; page 377, Whole No. 150, March, 1914.

Military Preparedness. By Naval Constructor Richard Gatewood, U. S. N., H. M., 1914; page 631, Whole No. 151, May, 1914.

What Should be the Relations Between Battle and Reserve Fleets. By Captain W. S. Sims, U. S. N.; page 727, Whole No. 151, May, 1914.

Old Principles and Modern Applications. By Dudley W. Knox, U. S. N., H. M., 1914; page 1009, Whole No. 152, July, 1914.

The Battle of the Sea of Japan: Translation Japanese General Staff Report. By Captain W. T. Hoadley, U. S. Marine Corps; page 961, Whole No. 152, July, 1914.

Some Foreign and Other Views of War and the Study and Conduct of War. By Captain Albert Gleaves, U. S. N.; page 1301, Whole No. 153, September, 1914.

Strategic Problems and Their Solution. By Captain R. von Labres, I. G. N. Translated by Surgeon J. F. Leys, U. S. N.; page 1409, Whole No. 153, September, 1914.

Bureau of Information

The Institute offers its services as a "Bureau of Information" on professional questions and will endeavor to obtain replies from the best qualified sources. Those "Questions and Answers" which are suitable for purposes of general information, will appear in the PROCEEDINGS. It is suggested that knotty questions which come up in professional examinations for promotion may well be submitted to this department.

Membership

Since May 12, 1915, 23 regular and 13 associate members have joined the Institute; 1 member resigned. The following members have died:

Commodore W. H. Beehler, U. S. N.
Commander W. C. P. Muir, U. S. N.
Ensign C. L. Pearse, U. S. N.
Ensign J. M. Manley, U. S. N.
Pay Director Stephen Rand, U. S. N.

The need for more members continues; bi-monthly publication should make the PROCEEDINGS more than ever valuable and necessary in keeping up with the naval profession; all members are asked to help in increasing the membership.

Notice

Whole Nos. 145 and 149 of the PROCEEDINGS (March, 1913, and Jan.-Feb., 1914) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

Address of Members

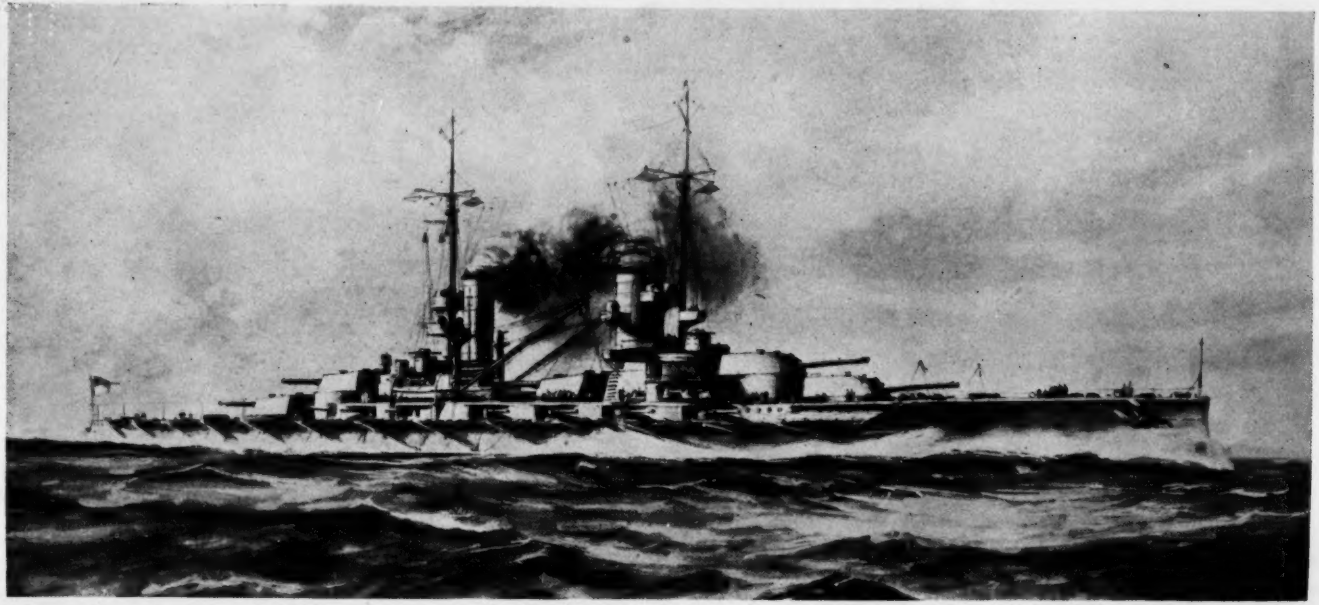
Members, especially those on the retired list, and civilians are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS are to be sent, and thus insure their receipt.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

ANNAPOLIS, MD., July 20, 1915.

NEW GERMAN SUPER-DREADNOUGHT



THE BATTLESHIP "KONIG"

Launched at Wilhelmshaven, March 1, 1913. Displacement, 26,575 tons; length, 580 feet; beam, 97 feet; draft, 27¼ feet; indicated horse-power, 35,000; speed, 23 knots. Armament, ten 12-inch, fourteen 5.9-inch, twelve 3-pounders; two machine guns and five torpedo-tubes. Complement, 1150. Estimated cost, £2,500,000.

PROFESSIONAL NOTES

Prepared by LIEUTENANT C. C. GILL, U. S. Navy

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NAVAL POWERS

ARGENTINE REPUBLIC

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Rivadavia.....	27,940	22.5	12 12-in., 12 6-in., 16 4-in.	Fore River Co.	Completed
Moreno.....	27,940	22.5	same	New York Co.	Completed

NOTE.—Argentine has four destroyers, displacement 950 tons, contracted for (two built at Nantes and two at Bordeaux), launched in 1911 but not yet turned over to the government. Also four additional destroyers of about 950 tons to replace those sold to Greece, building at Krupp's Germania Works. (It is presumed that these destroyers have been taken over by France and Germany respectively, as war measures.)

AUSTRIA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Prinz Eugen..	20,010	20	12 12-in., 12 5.9-in., 18 12-pdrs.	Trieste	Commissioned
Szent Istvan..	20,010	20	same	Fiume	Launched Jan. 17, 1914
Ersatz Mon'ch	24,500	22½	10 14-in.	Trieste	To be laid down, 1914
" Budapest	24,500	22½	same	"	" " " " 1914
" Wien....	24,500	22½	same	Fiume	" " " " 1914
" Hapsburg	24,500	22½	same	Trieste	" " " " 1915
Small Cruisers					
Saida.....	3,454	27	9 4.1-in., 2 6-pdrs.	Monfalcone	Trials Apr., 1914
Helgoland	3,454	27	same	Fiume	Launched Nov. 23, 1912
Novara.....	3,454	27	same	"	" Feb. 15, 1913

NOTE.—Three destroyers launched in 1913, displacement 787 tons, nearing completion. Two submarines, displacement 550 tons, and three of 860 tons, contracted for in 1912 are to be built by Krupp Co. There are also 27 torpedo-boats of 250 tons displacement in various stages of construction. In lieu of definite information regarding progress in ship construction since outbreak of war conjectures may be based on dates in column headed "Remarks."

KRUPP SUBMERSIBLES FOR THE AUSTRO-HUNGARIAN NAVY.—Among the latest additions to the naval forces of Austria-Hungary are two submersible craft, the *U 3* and *U 4*, built by the Fried. Krupp Aktien-Gesellschaft Germaniawerft, Kiel. Mr. Frederick C. Coleman, writing in the *Scientific American*, gives the dimensions of these vessels as follows:

Extreme length	142 ft. 0 in.
Breadth	12 ft. 4 in.
Surface draft	9 ft. 8 in.
Underwater displacement	400 tons.
Surface displacement	235 tons.

Each submersible has a double skin, the inner shell, which is in the form of a cigar-shaped watertight body, having a structural strength sufficient to resist hydraulic pressure equivalent to that experienced at a depth of 165 feet. The watertight hull is formed of nine welded circular sections, the three sections amidships being cylindrical and the remaining fore and after sections conical. The hull is subdivided by means of bulkheads into several watertight compartments. In order to give the vessel good sea-going qualities, the outer shell is constructed in much the same form as that of an ordinary torpedo-boat, a weather deck extending for almost the whole length of the ship. This deck affords accommodation for the crew when the submersible is travelling on the surface. The conning-tower, situated amidships, is constructed of strong nickel-steel plates capable of resisting the attack of small guns, and is fitted with two periscopes and all the appliances necessary to control the ship in action. Communication between the conning-turret and the steering gear below is effected by voice pipes. Aft of the conning-tower is a conning-platform for surface navigation, and the only opening giving access to the vessel is placed immediately above the former. The tower is enclosed in a torpedo-shaped structure, designed so as to give the least possible resistance when the submersible is travelling under the surface.

The bow section of each vessel contains the torpedo armament, consisting of two 18-inch Whitehead torpedo-tubes and a supply of three torpedoes and accessories, while the section abaft this is occupied by the crew and also contains a storeroom for electric batteries, the galley, an electrical cooking range, and lavatory accommodation. The inner ballast tanks are situated amidships, and just below the conning-tower is placed the steering gear for the two pairs of diving rudders. The engine room, situated aft of the ballast tanks, contains the propelling machinery and electric motors, and the aftermost watertight compartment is reserved for another battery of accumulators.

Mr. Coleman points out that a particular feature of German submarine policy has been the provision of salving appliances, a feature which is emphasized in the boats under consideration. A safety keel weighing five tons is fitted to each vessel and can be detached by a simple and easily operated mechanical arrangement. If necessary, this type of submersible can be refloated in one and a half minutes by the emptying of the ballast tanks. Adequate appliances of the latest description have been provided for the purification of the air, and air connections are fitted to the outside platform, which, under certain conditions, would allow of direct communication with the atmosphere. A buoy, carried on the deck, can be unfastened from the inside of the hull in order that a telephonic connection might be established with a rescuing crew.

Each submersible is propelled on the surface by two two-cycle heavy-oil engines, aggregating 600 horse-power; while for propulsion when submerged two electric motors designed to develop 320 horse-power operate the two reversible screws. The engine-room auxiliaries comprise two main and one subsidiary motor-driven bilge pumps, two hand bilge pumps for exhausting bilge and ballast water, and the usual outfit of air compressors and other accessories The surface speed attained on trial was 12 knots, but it is anticipated that this will be surpassed during deep-water trials; the submerged speed was 8 knots. A radius of action of 1200 miles above water and 60 miles submerged is given, on the basis of an economical speed of 10 and 6 knots respectively.—*Shipbuilder,* June.

CHINA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Light cruisers					
Fei-Hung	2,600	22½	2 6-in., 4 4-in., 2 3-in., 6 3-pdrs.	N. Y. Ship Bldg. Co.	Sold to Greece
.....	4,800	27	.....	Montalcone	Ordered Nov., 1913
.....	1,800	24	.....	"	Contracted for Sept., 1913
.....	1,800	24	.....	"	same
.....	1,800	24	.....	"	same

NOTE.—Four destroyers, displacement 400 tons, are building, one at Trieste and three at Schichau. The three Schichau boats have been delivered.

DENMARK

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Niels Juel.....	3,675	16	2 9.4-in., 4 5.9-in.	Copenhagen	Laid down Sept., 1913

NOTE.—Three destroyers are under construction at Copenhagen and three submarines, displacement 200 tons, are being built by Whitehead Co. (The submarines have probably been taken over by England.)

FRANCE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
France	23,092	20	12 12-in., 22 5.5-in.	St. Nazaire	Commissioned
Paris.....	21,092	20	same	La Seyne	"
Bretagne.....	23,172	20	10 13.4-in., 22 5.5-in.	Brest	Launched April 21, 1913
Provence.....	23,172	20	same	Lorient	" April 20, 1913
Lorraine	23,600	20	same	St. Nazaire	" Sept. 30, 1913
Languedoc	24,828	21.5	12 13.4-in., 24 5.5-in.	La Seyne	Laid down April 28, 1913
Normandie....	24,828	21.5	same	St. Nazaire	" July 5, 1913
Flandres.....	24,828	21.5	same	Brest	" Oct. 10, 1913
Gascogne.....	24,828	21.5	same	Lorient	" Oct. 1, 1913
Bearn	24,828	21.5	same	La Seyne	Contract Jan. 7, 1914

NOTE.—There are approximately six destroyers and 23 submarines under construction.

FRENCH BATTLESHIPS "BRETAGNE" AND "PROVENCE."—The battleships *Bretagne* and *Provence*, laid down on May 1, 1912, and July 22, 1912, respectively, have recently carried out their official trials and now form a part of

the Mediterranean fleet of the French Navy, where they are the largest battleships in the fleet. The main particulars of these two battleships are:

Length over all	545 feet
Beam	88 feet
Draft, forward	28 feet
Draft aft	29 feet 3 inches
Displacement, on normal draft	23,546 tons
Area of midship section	2,752 square feet
Brake horse-power	28,000
Contract speed	20 knots

In both vessels the hull is similar to that of the *France*, there being, however, no special under-water protection, as was the case in the vessels of the *Gascogne* class, described in the December, 1914, issue of this journal. The main armor belt extends for the full length of the ship, having a maximum thickness of 11 inches for a length of 197 feet amidships, reduced to 7 inches at the ends. This belt of armor extends 5 feet 7 inches above the load water-line and 7 feet 9 inches below the load water-line. Amidships, the funnels, the secondary battery, the base of the conning-tower and the base of the central turret are protected by 7-inch armor, forming a citadel. All casemates are also protected by 7-inch armor. There are two protective decks, one of 1 9/16-inch plate, and the other of 3-inch plate, the lower protective deck extending 6 feet below the load water-line.

The single conning-tower, which extends well above the forward turrets, is protected by 12-inch armor, the tube leading to the lower decks being protected by 10-inch armor. The conning-tower is divided into two compartments. The forward compartment is the navigating station and the after compartment the fire-control station. Above the conning-tower are two range-finder stations.

On the *Bretagne* steam is supplied at a pressure of 256 pounds per square inch by twenty-four Niclausse boilers of an improved type, having a total heating surface of 65,000 square feet and a total grate area of 2090 square feet. The funnels on this ship extend to a height of 66 feet above the load water-line. On the *Provence* steam is supplied at the same pressure by eighteen boilers of the Guyot du Temple type, having a total heating surface of 63,000 square feet and a total grate area of 1500 square feet. This is the first time that boilers of the torpedo-boat type have been used on a ship of this size, and the performance of the *Provence* under severe service conditions will be followed with interest—especially so because some of the vessels of the *Normandie* class will also be fitted with this type of boilers.

According to the contract, the following figures for coal consumption were stipulated: 10-hour full power trial, 2700 pounds per mile; 3-hour full power trial, forced draft, 321 pounds per square foot grate area; air-pressure in boiler rooms, 1 inch of water; 24-hour trial, 1853 pounds per mile; endurance trial with one-half boilers in service 1168 pounds per mile. The bunkers have a capacity of 2700 tons of coal and 300 tons of oil.

In both vessels the main engines are Parsons turbines, arranged, according to the latest practice, on four shafts, without cruising turbines. The engines for the *Bretagne* were supplied by the Mediterranean Works and for the *Provence* by the Loire Works.

The electric plant consists of four generators, each of 200 kilowatts capacity. Forward and aft, near the turrets, there are also two other similar electric generators, making the total power of the generating sets 1700 horse-power. All of the generators are driven by high-speed reciprocating engines.

Nearly all of the auxiliaries on the vessels are operated by electricity. Except in the engine and condensing rooms, all parts of the ship are ventilated by electrically driven fans. The ammunition rooms are cooled by Westinghouse-Leblanc refrigerating apparatus.

The *Bretagne* and *Provence* are the first battleships of the French Navy to carry an armament consisting of ten 13.5-inch guns all mounted on the center-line of the vessel. The guns are placed in five turrets located on the center-line of the ship, the guns in turret No. 1, forward, being at an elevation of 30 feet 6 inches above the load water-line; those in turret No. 2 at an elevation of 37 feet 9 inches; those in No. 3, 36 feet 6 inches; in No. 4, 29 feet, and in No. 5, 22 feet. The arc of fire for the guns in turrets Nos. 1 and 2 is 135 degrees; in Nos. 2 and 4, 140 degrees, and No. 3, 120 degrees. The turrets are protected by 13.5-inch armor on the face; 10-inch armor at the rear, while the base is protected by 11-inch armor.

The secondary armament consists of twenty-two 5.5-inch guns arranged in five casemates on each side of the ship. These guns have an arc of fire of 120 degrees and are located 19 feet above the load water-line. Four 18-inch torpedo-tubes are also provided.—*International Marine Engineering*, May, 1915.

In 1913 we published the first plans and description of the French *Normandie* type of dreadnoughts given in this country. Much interest was aroused on that occasion because authentic details were given of the new quadruple barbette which had been evolved by the French Ministry of Marine and mounted in the *Normandie* class. We are now able to give our readers the plans and details of the latest French *Tourville* type of battleship. This class comprises four vessels—the *Tourville, Duquesne, Lyon*, and *Lille*. Their armament of sixteen 13.4-inch guns, mounted in four great quadruple barbettes, represents the most numerous battery of primary guns ever mounted in a capital ship of the dreadnought era.

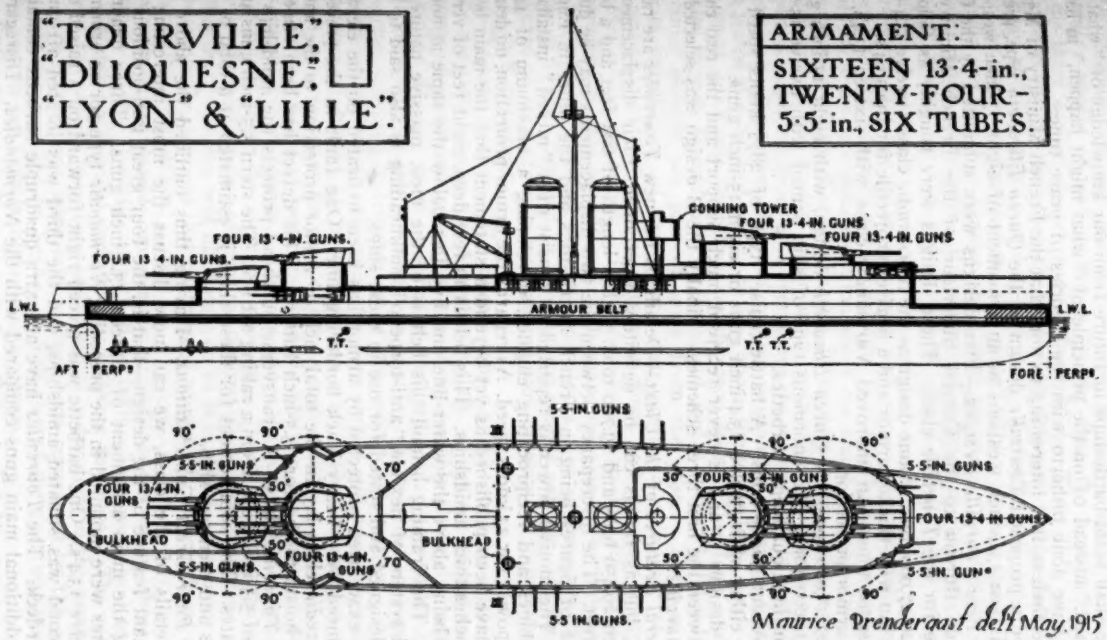
Shortly before war broke out the writer was invited to contribute an article to a certain publication on the subject of future developments in battleship types. He declined because there was some evidence at that time of a possible "split" developing in dreadnought types. Only time could show whether this "split" would heal up or become wider. But since it had come into existence, there was no use in forecasting future warship design before seeing if naval architects would range themselves in two opposite camps. There was no trace of any division of opinion on the actual dreadnought principle of "all big guns." The point of issue that was beginning to arise centered on the question of the size and number of the guns.

The first examples of this possible division in battleship types were afforded by the *Rio de Janeiro* (now the British *Agincourt*), armed with fourteen 12-inch guns, and the new French *Tourvilles*, equipped with sixteen 13.4-inch weapons. These two types might either prove to be a passing and abnormal development of design, or else become the first exponents of a new type of dreadnought. If later types did develop from them, warship designers, after nine years' unanimity in the dreadnought design, might divide themselves into two schools. One school—of the *Queen Elizabeth* cult—would stand out for the old principle of eight to ten guns of the largest possible size, whether of 15-, 18-, or 20-inch caliber. The other and "heretical" school would advocate the French *Tourville* and *Agincourt* types on the grounds that (a) monster calibers embodied superfluous inches in bore, (b) that the 13.5-inch type of gun was adequate for all practical purposes, so that (c) any increase in the displacement of battleships should allow for a larger battery of "adequate" guns, and not for a few weapons of monster size.

If these two schools did come into existence, we might have had two kinds of super-dreadnought types developing side by side in a few years' time, roughly, as follows:

1918

Derived from	
Queen Elizabeth	French Tourville
Eight or ten guns of 18- or 20-inch caliber	Twenty guns of 13.4-inch caliber



THE NEW FRENCH SUPER-DREADNOUGHTS

Warship design was accordingly entering on a stage of exceptional interest at that time, accompanied by the possibility of a great controversy arising about the above two types of battleships. However, war broke out, and we shall build battleships in future from our knowledge of "what has happened," instead of on the principle of "what might happen," in battle, as we have done hitherto with the theories of peace time.

Nevertheless, it is interesting to note that the French Ministry of Marine rejected a proposed *Tourville* design of the *Queen Elizabeth* type, preferring sixteen 13.4-inch weapons to an armament of eight 15-inch weapons.

The Five Tourville Designs.—Five designs were submitted by the Construction Bureau to the Conseil Superieur of the French Ministry of Marine for the *Tourville* class. These designs were roughly as follows:

A—26-27,000 tons. Same design as the *Normandie* class (twelve 13.4-inch guns), but with thicker armor and a heavier projectile for the 13.4's.

B—29,500 tons. An improved *Normandie* class, with sixteen 13.4's, and better armor protection.

C—27-28,000 tons. A *Queen Elizabeth* design, with eight 15-inch guns.

D—32,000 tons. An enormous type of ship armed with twelve 15-inch guns in three quadruple barbettes.

E—About 30,000 tons. A battle-cruiser type of 28½ knots speed and armed either with twelve 13.4-inch guns or eight 15-inch guns.

The designs D and E never received much support and the real choice lay between the first three schemes. Finally the B design was selected for the *Tourvilles.*

General Features of the Class.—Details of the new *Tourvilles* are rather scanty, but as far as can be definitely ascertained, their displacement is between 29,450 tons and 29,700 tons, with a length of 623 feet and a beam of 93 feet. The discrepancy between the two displacements may be due to one set of figures being in French metric-tons and the other in English tons. The motive power is reported to consist of a "mixed" installation of turbines and reciprocating engines, developing a maximum of 44,000 horse-power for 23 knots speed. As regards the armor protection, no detailed sizes have been published as yet beyond a statement that the main belt is 13¾ inches thick amidships. This belt is 13 feet deep, eight feet of vertical armor being above the water-line and five feet below the same at normal draft. The framing behind this belt is of the most massive nature. A special system of flexible "anti-torpedo" bulkheading is also said to have been designed and tested for use in these ships.

The exact area protected by armor has been indicated on the elevation reproduced by a heavy black bordering line. One fault in the preceding *Normandie* class lay in the total lack of armor protection to the ammunition hoists to the fore 5.5-inch battery. This defect has been remedied in the *Tourville* class. A transverse bulkhead protects the amidships batteries of 5.5-inch guns from a raking aft fire. The stern 5.5-inch guns are in casemates. The complement for these ships is estimated at a total of 1190 officers and men per ship.

The Four Great Gun-Positions.—Having thus outlined the above general details of the class, we can now discuss the most interesting and important feature of the design—that is, the four great gun-positions containing the main armament of sixteen 13.4-inch guns. Three quadruple barbettes were mounted in the preceding *Normandie* type for an armament of twelve 13.4's. One barbette was placed right forward on a raised deck, the second was situated amidships, and the third was located aft on the quarterdeck. The *Tourvilles* have an extra quadruple barbette containing four additional main guns compared with the *Normandies.* Disregarding for the moment the actual number of guns in each position, it will be seen from the plan that the *Tourville's* scheme of disposing the main battery is just the same as that used in the *Queen Elizabeth.* There are two barbettes disposed towards the ends of the ship on the center-line, the inner positions super-firing over the extreme ones. By this means the *Tourvilles*

fire eight guns ahead and astern compared with four in the *Normandies*. As was recently pointed out in *The Navy*, the number of guns available for end-on fire in the *Tourville* class equals the full broadside fire of earlier dreadnoughts like the *Bellerophon*, *Michigan*, and *Nassau*. The *Tourville's* weight of end-on fire is heavier than the broadside weights for the three earlier classes named, because the *Tourville's* eight 13.4's fire a much heavier shell than the projectiles delivered by the *Bellerophon*, *Michigan*, and *Nassau's* 12- and 11-inch guns. Unfortunately, actual figures cannot be given to demonstrate this point. The 13.4-inch guns for the *Tourville* are to fire a heavier shell than the guns of the same caliber mounted in the *Normandie*. But the actual increase in shell-weight is not definitely known, so the end-on fire of the *Tourville* class cannot be calculated.

Command of Guns.—The elevation also shows that the two forward barbettes of the *Tourville* are placed on a raised deck, the inner one being carried up to an enormous elevation above the water-line. Working from a combination of the *Normandie* and *Bretagne* gun-heights, we find that the gun-axes of the former super-firing position in the *Tourville* must be raised to a height of about 43¼ feet above the water-line. In order to get a clear view ahead over the roof of this position, the conning-tower has to be placed at a level of nearly 50 feet above the water-line. Each of the four great quadruple barbettes weighs 2300 tons. The four guns are mounted in pairs to each side of the shield, and a 12-inch bulkhead down the center isolates one pair of guns from the other. There are also separate installations of fire-control instruments to each pair of guns. The port-plate of the shield is extremely thick, and measures between 17 and 18½ inches in section. The *Tourville* gun-shields differ from the *Normandies*, as they are of a British shape on plan. The *Normandie's* shields are almost circular, like the earlier types used in French battleships. The usual French standard of stowing 100 rounds per gun will no doubt be adhered to, thus giving a total ammunition capacity of 1600 rounds for the 13.4-inch armament.

Anti-Torpedo Battery.—The twenty-four 5.5-inch guns are disposed in exactly the same way as the *Normandie* class. They are placed together in groups of three and as widely spaced as possible along the hull. By this method damage from shell fire is localized as far as possible to one set of guns without any detriment to rapidity of ammunition supply by having too scattered a distribution of the anti-torpedo battery. After a battleship action, one or two groups of guns should still remain serviceable for beating off attacks by hostile torpedo craft. The ammunition supply provides for 275 rounds for each of the 5.5-inch guns.

The elevation also shows the broadside position for three of the six tubes installed in the design. Two are under the fore barbettes, while the third is placed under the after-gun positions. It has also been the custom for French dreadnoughts to carry 30 Sauter-Harlé semi-automatic mines. Whether the *Tourvilles* will ultimately do so is in doubt, on account of the violent internal explosions that contributed so much to the rapid end of the *Bouvet* in the Dardanelles.

Contracts.—Considerable uncertainty prevails as to where these four battleships of the *Tourville* class will be built. Two were said to have been allocated to the naval dockyards at L'Orient and Brest. The vessel at L'Orient was said to have been laid down in a dry dock in the summer of 1914. The second pair were said to have been contracted by the private firms at St. Nazaire and La Seyne. A fifth ship of the class was provided for this year in the French shipbuilding program.

French Dreadnought Progress.—In conclusion, a brief summary can be given of the French dreadnought types as they stand at present. The four *Barts* (*Jean Bart, Courbet, France* and *Paris*) have been in continuous service since the very first day of the war, with the exception of the *Bart* herself. She was torpedoed in the bows by an Austrian submarine and

was immobilized for two months at Malta undergoing repairs. The *Press* has recorded the launch of three battleships of the *Normandie* class (*Normandie, Gascogne, Languedoc*), while two other ships (*Flandres* and *Bearn*) are rapidly approaching the launching stage.

NEW HEAD FOR FRENCH NAVY.—Coinciding with the advent of a new British First Sea Lord, a new "Chef d'Etat-Major-Général" is, in the person of Admiral de Jonquières, assuming, for France, the upper direction of the comprehensive war game in which her fleet is engaged in close co-operation with the English Navy. It is the second time, it will be remembered, that the post of supreme responsibility in the French service has changed hands since the commencement of the war, Admiral Pivet having been replaced several months ago by Admiral Aubert, now deceased, who was selected for his seniority and the high authority he enjoyed. Considerations of the same order have led to the appointment of Admiral de Jonquières, who under peace conditions would have reached this month the age limit for compulsory retirement, and now receives a fitting reward for his exceptionally brilliant services. Late attaché in Berlin, and successively chief of the Far Eastern division and of the flotillas, and commander-in-Chief in the Mediterranean, where he continued the work of the regretted Admiral Germinet, and later vice-president of the Conseil Superieur, the new professional head of the Rue Royale Administration, who is besides a gentleman of remarkable vigor for his years, is seen to be admirably qualified for a post which requires, to an equal degree, a wide experience afloat and ashore, uncontested authority, firmness, and work power.—*Naval and Military Record*, 6/16.

FRENCH MINELAYERS.—The loss of the small minelayer *Casabianca*, though in itself of no very great importance, deprives the French Navy of a useful craft belonging to a class none too numerous in the service, and the war value of which has been amply demonstrated in the course of the present conflict. Originally the *Casabianca* and her sisters *Cassini* and *d'Iberville* (1893-1895) were intended as contre-torpilleurs against the first English destroyers of the 27-knot series. But, despite their displacement of 950 tons, their speed of 21.5 knots unsuited them for a rôle of that sort. Yet, like their British contemporaries of the *Speedy* class, they have proved robust and seaworthy boats, and have outlived most Gallic protected cruisers of their period. In this respect, just like the once much-criticized English torpodo-gunboats, they must be said to have been no bad investment, since the true value of a ship, from the ratepayers' standpoint at least, is measured by the number of years during which it adds strength to the navy of which it is a part. An excellent utilization was found for the *Casabianca* and *Cassini* in 1911, when it was decided to convert them into minelayers in imitation of what had been done with British cruisers of the *Iphigenia* type, and in 1912, after lengthy trials at Toulon, their transformation was pronounced a success, though it had for effect the raising of their displacement to over 1020 tons and reducing their speed. Their complement of mines did not exceed 97, which is a rather small supply, calculated to limit their scope of action; but from the first the Rue Royale authorities adhered to the opinion that "porte-mines" (as officially called here), from the dangerous nature of their mission, must be of reduced displacement, and the new minelayers *Pluton* and *Cerbère* are smaller still, displacing 566 tons only, but carrying 120 mines of 550 kilos each.—*Naval and Military Record*, 6/16.

VICE ADMIRAL NICOL.—The command of the French "Flotte du Levant" has been entrusted to Vice Admiral Nicol. Admiral Nicol, though the youngest officer of his rank (57 years of age), is generally held to be well qualified, by his professional attainments and personal qualities, for the exceptional honor conferred upon him. He is known as the chief of few

words, all work and decision; and the high degree of efficiency the Republican Navy has attained since its renovation is due in a great measure to his ability and untiring activity. His practical experience of the various branches of fleet work will be readily understood when it is stated that, after superintending the training of the "Flotte de la Méditerranée," as chief of staff of Commander-in-Chief de Jonquières, he was for two years (1912-1914), as Chef d'Etat-Major-Général in the flagship *Voltaire*, the "brás droit" of Admiralissimo de Lapeyrère during a period of intensive preparation for war, marked by substantial progress in gunnery and by the execution of comprehensive themes of exercises, in which the problem of modern blockade invariably occupied a prominent place. It is the good fortune of the French Navy, at the moment of need, to have in the commanders of her three principal forces (Lapeyrère, Favereau, and Nicol) trusted leaders who received in peace time a direct preparation for the discharge of the responsible duties confided to them and fulfilling all the conditions necessary to success. This is the gratifying result of the reforms made in 1909, when a larger sea force was commissioned and the English habit was adopted of appointing young flag officers. Had the war occurred some six years since it would have found the Republican fleet in an undeniable state of unpreparedness, with improvized commanders-in-chief without previous experience in the handling of large forces at sea.—*Naval and Military Record*, 6/16.

GERMANY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Grosser Kurfürst	26,575	23	10 12-in., 14 5.9-in., 12 3.4-in.	Hamburg	Commissioned
Markgrat	26,575	23	same	Bremen	"
König	26,575	23	same	Wilhelmshaven	"
Kronprinz	26,575	23	same	Germania	Launched Feb. 21, 1914
Ersatz Worth	29,000	....	8 15-in., 16 5.9-in.	Kiel	Laid down Sept., 1913
"T" 1913	29,000	....	same	"	" May, 1913
Ersatz Friedrich III	30,000	....	8 15-in., 18 5.9-in.	....	" summer 1914
Cruisers of the Line					
Lützow	28,000	28.5	8 12-in., 14 6-in.	Dantzig	Launched Nov. 29, 1913
Derfflinger	26,500	28.5	same	Hamburg (Blohm & Voss)	Commissioned
Ersatz Hertha	28,000	28.5	8 12-in.	Wilhelmshaven	Laid down July, 1913
Ersatz Victoria Louise	....	....	....	....	" summer 1914
Protected Cruisers					
Karlsruhe	4,900	28	12 4.1-in., 2 t. t.	Germania	Commissioned
Rostock	4,900	28	same	Howaldt	"
Regensburg	4,900	27.5	12 4.1-in.	Bremen	"
Graudenz	4,900	27.5	12 14.1-in.	Kiel	"
Ersatz Hela	5,500	27.5	10 6-in.	"	Laid down fall 1913
Ersatz Gefion	5,500	27.5	same	Stettin	" "
Ersatz Niobe	....	....	....	....	" summer 1914
Ersatz Gazelle	....	....	....	....	same

NOTE.—Germany has twelve destroyers and twelve or more submarines under construction. Tonnage of ships building uncertain. Changes in construction program because of war are problematical.

HAMBURG SHIPYARDS RUSH NEW SUBMARINES

GENEVA, SWITZERLAND, May 11 (Via Paris).

A Swiss engineer who arrived here to-day from Hamburg said that the shipyards in that city were turning out three finished submarines a month. Two of them are of the larger class and one of the smaller type used for coast defence.—*N. Y. Times*, 5/12.

GERMAN SUBMARINE CONSTRUCTION.—Since the opening of the war the Admiralty have announced the destruction of seven of the enemy's submarines, apart from one which the *Badger* is supposed to have sunk off the Dutch coast. The loss of the ships is the least serious part of the business for the enemy. Far more disconcerting is the loss of the officers and men, whether by drowning or by capture. It has been said that the Germans are turning out two submarines every fortnight. It is a statement which should be accepted with reserve. Hitherto the average period of construction of submarines has fallen little short of two years, but it has been always admitted to be possible to build a submarine in about twelve months. It may be that under the pressure of war the work can be done in about half that time, if the Germans have available the necessary skilled labor. To complete two submarines every fortnight on this basis, if engines and material of all kinds be ready the instant they are required, would necessitate fifty-two slips being reserved exclusively for submarine construction, if the vessels were completed before being put afloat. If the work of completion were carried out in the water, then about half that number of slips would suffice. But it may be admitted that the Germans are probably making many additions to their submarine flotillas. They can thus replace the craft which are being lost, but they cannot replace so readily the officers and men either drowned or taken prisoners.—*Naval and Military Record*, 6/16.

GERMANY'S NEW SHIPS.—An interesting and probably fairly correct account of the submarine building activity of the Germans since the war began is given in the *Daily Mail* of the 21st of June and other papers. It comes (via America) from a German naval officer interned in Holland. He states that 48 submarines in all have been completed, 24 of which are of 1200 tons, with a surface speed of 20 knots, and a steaming radius of 3000 miles, 12 are of 800 tons, and of a surface speed of 20 knots, 12 are of 300 tons with a surface speed of 18 knots. The larger boats carry 4 torpedo-tubes, and "two heavy quick-firing guns." This is a formidable submarine fleet, and we should be glad if our efforts served to reduce the number of boats as fast as the Germans completed them.

This correspondent also tells us of a super-dreadnought and a battle-cruiser of 25,600 and 26,200 tons, having been completed and armed with 15-inch guns. This was to be expected, though the substitution of 15-inch guns for the 12-inch originally intended would involve considerable structural alterations. Jane shows 6 dreadnoughts and 3 battle-cruisers in course of construction when war broke out, 5 of which were expected to be completed in 1914 or 1915, two of the battleships being credited with 15-inch guns. The ships referred to are probably the *Koenig*, battleship, and the *Lutzow*, battle-cruiser, and there is the Greek dreadnought cruiser *Salamis* building, which it is understood has been commandeered and commissioned for the German Navy.—*United Service Magazine*, July.

THE "SALAMIS."—At the outbreak of hostilities last year, the battleship *Salamis*, ordered by the Greek Government, was under construction in Germany, and without doubt this vessel has now been added to the German high seas fleet. The *Salamis* displaces 19,200 tons and was originally intended to be armed with eight 14-inch and twelve 6-inch guns. Her designed speed is 23 knots. In addition to the *Salamis*, four other battleships, viz.,

the *Konig, Grober Kurfurst, Markgraf,* and *Kronprinz,* will now either be completed or nearly so. These vessels are each fitted with ten 14-inch guns.—*Shipbuilder,* July.

GRAND ADMIRAL VON TIRPITZ.—Recently Grand Admiral von Tirpitz celebrated the fiftieth anniversary of his entry into the German Navy. The son of a judge, he was sixteen years of age when he became a naval cadet, and he put in thirty-two years' service afloat and ashore before he was installed in the position of Secretary of State for the Imperial Navy Office. That was in 1897, and his long incumbency of the post has earned for him the nickname of "Tirpitz the Eternal." Of his work during these eighteen years, the German fleet to-day is the result. He found it of comparatively small account, and increased it to be the second in strength in the world. This, for a military power like Germany, to whom a big fleet is a pure luxury, was a marvellous achievement. Its accomplishment is a tale of subtle methods, of smiling persistency, and of energetic determination. Under von Tirpitz's magic spell, Germans were taught to believe that their future lay upon the water. How this belief grew is shown by the Navy Acts. No sooner had the grand admiral formulated one of a character which without exaggeration could be described as ambitious than he set to work to educate the people to the need for still greater efforts, and so there were produced those "amendments" by which the seventeen ships of the line the program of 1898 were increased to the fifty-three ships of the line in the program of 1912. The Kaiser found in von Tirpitz a man after his own heart. No one better than the grand admiral could carry out the Imperial will and command. Some five years ago the *Münchener Zeitung,* in connection with a report that the secretary had resigned, quoted this speech of the Emperor to the chancellor: "Can you get me a successor for Admiral von Tirpitz? The matter must wait over till I come back from Norway. I don't want to lose him." So the wizard remained, and on Saturday he received from his royal master a telegram expressing "warmest gratitude for the great services you have rendered to the Fatherland by the successful expansion of the navy. With justified pride you can look to-day on this your life work, the importance of which in the present war has been strikingly shown."—*Army and Navy Gazette,* 5/1.

BUILDING DESTROYERS AND SUBMARINES AT ANTWERP.—Our contemporary, *The Navy and Army,* is inclined to believe that the two torpedo-boats recently sunk off the Dutch coast by the British Navy, were built in Antwerp and came out from that port—this belief being based on the fact that it would be impossible for them to have come from Heligoland or Wilhelmshaven or even Emden, because the intervening waters are too well patrolled. Although Antwerp is in Belgium, warships constructed there would have to pass through Dutch territory by way of the Scheldt, to reach the North Sea. That would be a breach of neutrality; but the Germans evidently would not consider this an insuperable difficulty. The Belgian coast and the French coast up to Havre are greatly coveted by Germany, because of their nearness to the British south coast, and the control they would give of the English Channel.—*Scientific American,* 6/26.

GREAT BRITAIN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Benbow.....	25,000	22	10 13.5-in., 16 6-in.	Beardmore	Commissioned
Emperor of India	25,000	22	same	Vickers	"
Iron Duke.....	28,000	22	same	Portsmouth	Commissioned Mar., 1914
Marlborough..	25,000	22	same	Devonport	Trials Mar., 1914
Qu'n Eliz'b'h..	27,500	25	8 15-in., 16 6-in.	Portsmouth	Launched Oct. 16, 1913
Warspite.....	27,500	25	same	Devonport	" Nov. 26, 1913
Valiant.....	27,500	25	same	Fairfield	" Dec., 1913
Malaya.....	27,500	25	same	Walker	Laid down Oct. 20, 1913
Barham	27,500	25	same	Brown & Co.	Launched Feb., 1914
Roy'l Sover'gn	25,500	21	same	Portsmouth	Laid down, Jan. 15, 1914
Royal Oak.....	25,500	21	same	Devonport	" Jan. 15, 1914
Resolution....	25,500	21	same	Palmer	" Nov. 28, 1913
Ramillies.....	25,500	21	same	Beardmore	" Nov. 12, 1913
Revenge.....	25,500	21	same	Vickers	" Jan., 1914
Battle Cruisers					
Tiger.....	30,000	30	8 13.5-in., 12 6-in.	Brown & Co.	Launched Dec. 15, 1913
Light Cruisers					
Brisbane.....	5,400	25	9 6-in., 4 3-pdrs.	Sydney	Laid down Jan. 25, 1913
Birmingham...	5,440	25.5	same	Elswick	Commissioned, Feb. 3, 1914
Lowestoft.....	5,440	25.5	same	Chatham	" Apr. 21, 1914
Nottingham...	5,440	25.5	same	Pembroke	" Apr. 3, 1914
Aurora.....	3,600	30	2 6-in., 8 4-in.	Devonport	Commissioned
Arethusa.....	3,600	30	same	Chatham	"
Penelope.....	3,600	30	same	Barrow	Laid down Feb. 1, 1913
Phaeton.....	3,600	30	same	"	" March 12, 1913
Royalist.....	3,600	30	same	Dalmuir	" June 3, 1913
Galatea.....	3,600	30	same	"	Commissioned
Inconstant....	3,600	30	same	"	Laid down April 3, 1913
Undaunted....	3,600	30	same	Govan	Commissioned
Cleopatra	4,400	30	.....	Devonport	Laid down Feb. 26, 1914
Calliope.....	4,400	30	.....	Chatham	" Jan. 1, 1914
Conquest.....	4,400	30	.....	"	" Feb. 28, 1914
Cordelia.....	4,400	30	.....	Pembroke	Launched Feb. 23, 1914
Carysfort.....	4,400	30	.....	"	Laid down Feb. 25, 1914
Comus	4,400	30	.....	Wallsend	" Nov. 3, 1913
Caroline.....	4,400	30	.....	Birkenhead	" Jan. 28, 1914
Champion.....	4,400	30	.....	Hebburn	" Feb. 28, 1914

NOTE.—England has approximately 31 destroyers and 24 submarines under construction. (Changes in construction program since war are unknown.)

BRITISH BATTLESHIPS COALED AT SEA.—In order to enable a large number of British battleships continuously to guard the high seas so that their control of such may not be relaxed for a moment, the question of coaling the same at sea had to be solved. This has been done, and by means of a very ingenious device British battleships can be fueled while they are traveling through heavy seas at 12 knots an hour without their activities being in any way interfered with. Colliers packed to the hatches with fuel maneuver to within about 400 feet astern of the battleship to be coaled. Cables are passed from ship to ship, and sacks of coal, in loads weighing a ton, are hoisted from the foot of the collier's mast to a platform at its head. By means of wheels running on a cable the load is forced by automatic winches along the sloping transport line at an exceedingly rapid rate, and after the coal is automatically released when it reaches the battleship, the transporter starts on its return journey to the collier.

This apparatus enables 60 tons of coal to be carried every hour across the gap of water separating the supply ship from the battleship with both

vessels under way. We are not positive, but from the description of this apparatus we should surmise that it might be the Miller marine transfer, manufactured by the Lidgerwood Company, 96 Liberty Street, New York.—*Marine Journal*, 5/15.

BRITISH DESTROYERS, "*L*" CLASS.—The British destroyers of the *L* class, which were built under the 1912-13 program, are proving a veritable terror to the enemy's torpedo craft and are also being treated with marked respect by German cruisers. It is believed that in essential details they are superior to any German destroyers afloat, and by their skill and daring their officers and crews have proved themselves worthy of their ships. In one of the first naval engagements after the outbreak of war—that in the Heligoland Bight on August 28, when several German cruisers and destroyers were sunk—they rendered splendid service, attacking without hesitation the enemy's cruisers both with guns and torpedoes; and only a few days ago four of the class sank two German torpedo-boats. Twenty vessels of the *L* class have been built from the designs of Sir P. Watts, the late Director of Naval Construction. They have a length of 260 feet, a breadth of 27 feet 8 inches, and a mean load-draft of 9 feet 5 inches, and their displacement is 965 tons each. They are fitted with turbines of 24,500 horse-power, giving a speed of 29 knots. Each has storage accommodation for 135 tons of oil fuel, and carries three 4-inch guns. A later type, called the *M* class, is believed to embody some important improvements upon their predecessors, but for obvious reasons the details have not been disclosed.—*Naval and Military Record*, 5/12.

TEN SUBMARINES FROM FORE RIVER.—The first of 10 submarines under construction at Quincy, Mass., by the Fore River Shipbuilding Corporation for the British Government was launched June 12. The boat is of the Holland diving type, with a cruising radius of about 1500 miles and a speed of seven knots submerged and 15 knots on the surface. The boat will not be delivered until the war is ended.—*Shipping Illustrated*, 6/19.

NAVAL INSTRUCTORS WANTED.—In view of special conditions which have arisen in consequence of the war, the Admiralty have decided to enter a number of naval instructors for temporary service. In general it is anticipated that such service will not extend beyond four years; but it is probable that some of the officers who enter for temporary service may have the opportunity, should they desire it, of remaining on a permanent footing. Candidates must have had an academical training and be proficient in mathematics. A knowledge of mechanical or physical science is desirable. Those who are selected will be appointed to the Royal Naval College, Greenwich, for a course of instruction in navigation and nautical astronomy, lasting not more than six months. During this probationary period they will rank as acting naval instructors, and will be entitled to wear uniform. On qualifying in the subjects of the course they will receive commissions as naval instructors, the commission being dated back to the date of entry. Any officers who fail to qualify within six months will be discharged. The pay from the date of entry will be at the rate of 12s. a day. During prolonged sickness or extra leave half pay of 6s. a day will be allowed. In addition to this, each naval instructor entered for temporary service will be entitled, when qualified and appointed to a ship, to receive a "tuition" allowance at the rate of £5 per annum for each junior officer under his instruction. He will also receive a messing allowance of 2s. a day for the period of the war. On discharge (except for misconduct or incompetence) he will receive a gratuity of £200 after two years' sea service, £300 after three years' sea service, or £400 after four years' sea service. Candidates should apply by letter to the Director of Naval Education, Admiralty, London, giving particulars as to their age, present employment, academical record, and other qualifications, and teaching experience, if any.—*United Service Gazette*, 6/3.

THE BRITISH MIDDY.—The work of old times, in which our seamen have always excelled, has been brought back to the navy in the present war. This is specially the case in the boat work which has been, and is still being carried out at the Dardanelles and on the rivers of Africa and Asia. In the old days there was a good deal of boat work and midshipmen had opportunities of distinguishing themselves, and to-day the voice of the middy rings out in clear tones among gruff and bearded men, giving orders in landing troops, while the enemy is pouring in a hot fire and the seamen and soldiers are going down by the dozen. These early baptisms of fire will all help to "salt" the middies and make hardy and resourceful officers of them at an early stage of their lives; for with their present experience many of them will be veterans at twenty. It is gratifying to record that already there has been more than one middy in the fleet mentioned in dispatches, and awarded honors for the fine courage they have displayed in meritorious performances, both ashore and afloat. The boat is preeminently the place for the midshipman, and a position where he is first able to show his aptitude for future work, for it is here that he is "in command" of the handful of men who fill the boat. The present generation now have a chance of showing that the British middy is as plucky and resourceful as his long line of predecessors have been, and they are using it to the full.—*United Service Gazette*, 5/20.

The following figures, extracted from the Navy Lists for July, 1914, and April, 1915, show at a glance the enormous increase that has been made in the strength of the Royal Naval Reserve since the outbreak of war:

	July, 1914	April, 1915
Captains	...	16
Commanders	44	66
Lieutenant Commanders	...	169
Lieutenants	559	668
Sub-Lieutenants	388	1,311
Midshipmen	294	470
Senior and Chief Engineers	26	137
Engineers	95	449
Assistant Engineers	21	552
Skippers	111	1,193
Warrant Engineers	176	189
Warrant Telegraphists	...	150
Staff Paymasters	13	17
Paymasters	49	49
Assistant Paymasters	182	614
	1,958	6,020

—*United Service Magazine*, May.

ENGLAND'S FIRST SEA LORD.—Admiral Sir Henry Bradwardine Jackson, K. C. B., K. C. V. O., F. R. S., who has been appointed to succeed Admiral of the Fleet Lord Fisher of Kilverstone as First Sea Lord of the Admiralty, is an officer who is very little known outside the service, but by fleetmen he is admired as being not only a fine sailor, but possessing an initiative that leads to success in anything he undertakes. Although we will not go so far as to assert, as one writer does, that he is "the cleverest man in the navy"—for we know others—yet to his genius are due many reforms and scientific developments that have resulted in advancing British sea power in various directions. For instance, he was one of the pioneers in wireless research, and it is said that he discovered the secret of practical electrical transmission of messages through the air almost, if not quite, synchronous with Signor Marconi. At a lecture and demonstration given by the latter at the Royal Service Institution some years ago, Lieutenant Jackson's experiments were alluded to by the chairman, who remarked that

whichever was the first at the invention, Marconi was prior in reaching the Patent Office.

Born on January 21, 1855, at Barnsley, the subject of our sketch is the eldest son of the late Mr. Henry Jackson of Cudworth, and was educated at Chester and at Stubbington. He entered the Royal Navy as a cadet on December 8, 1868, and was promoted to sub-lieutenant on October 18, 1874, and to lieutenant on October 27, 1877.

During the Zulu War of 1878-9 he was serving on board the *Active* on the South African Station, and was landed with a naval brigade, and for his services ashore he received the medal for the campaign. Having a predilection for torpedoes, he studied in this branch of naval warfare and the duties attaching thereto, and in 1882 won the Royal Naval College prize for proficiency in connection therewith.

He was promoted to commander on January 1, 1890, and to captain on June 30, 1896. In November following he was appointed a naval attaché a post he retained until 1899. In December of that year he was given the command of the *Vulcan* in the Mediterranean, which he relinquished in January, 1902, to take up the appointment in February of Assistant Director of Torpedoes at the Admiralty, where he remained until February, 1903. It is certainly due to Sir Henry Jackson that Hertzian waves were first used as a means of naval signalling, an outcome of his study of electrical physics, for which in 1901 he was accorded a rare honor for a naval officer—the Fellowship of the Royal Society. Much of our present success in wireless telegraphy we owe to his energy in developing what was previously a new and unfamiliar thing.

In March, 1903, he was appointed to the command of the *Caezar* in the Mediterranean, and was transferred to the *Duncan* on the same station in October of that year. This command he held until September, 1904, when he was appointed to the *Vernon,* where he was instrumental, during the five months he was in control, in developing the use of torpedoes.

It was only to be expected that an officer with his special knowledge would be of service in a more central capacity, and consequently it surprised no one when in February, 1905, he went to the Admiralty as Third Sea Lord and Controller of the Navy. He was advanced to flag rank on October 18, 1906 (in which year he was created K. C. V. O.), but was retained in his post at Whitehall until October, 1908, when he was appointed to the command of the third (afterwards the sixth) cruiser squadron in the Mediterranean in succession to Vice Admiral Sir H. D. Barry, his duties at the Admiralty being taken over by Rear Admiral Sir J. R. Jellicoe (now looking after British interests in the North Sea). During this command Sir Henry Jackson received permission from King Edward to accept and to wear the Grand Cross of the Order of Naval Merit conferred upon him by the King of Spain when, flying his flag in the *Bacchante,* he visited Valencia in May, 1909. Sir Henry remained afloat until October, 1910, when he came home to represent the Admiralty at the International Conference on Aerial Navigation, held at Paris from October 19 to December 21. He had been created K. C. B. on June 24.

On February 24, 1911, he succeeded Rear Admiral Lewis Bayly in command of the Royal Naval War College at Portsmouth, and on March 15 he was advanced to vice admiral. He was retained in this appointment and established a new record as being the first officer of that rank to hold the post.

In January, 1913, he took over the duties of chief of the war staff at the Admiralty, in succession to Rear Admiral Troubridge, being regarded as absent from the War College for duty at Whitehall pending the return of Rear Admiral the Hon. Sir Alexander E. Bethell from the East Indies Station to assume command at the college in the following month.

During the naval maneuvers in July, 1912, Sir Henry Jackson commanded the seventh squadron, flying his flag in the *Illustrious.* It will be remembered that the war staff at the Admiralty was an innovation, its office

during peace being to prepare plans for organization in war, and in war to organize the conduct of operations.

Sir Henry was promoted to full admiral on February 10, 1914, and was nominated to succeed in August last Admiral Sir A. Berkeley Milne in command of the Mediterranean fleet, but owing to the outbreak of the war he was retained at the Admiralty for special service. He has thus been working in conjunction with Lord Fisher, so that in now assuming the office of First Sea Lord he is acquainted with much that has been going on during the past few months. His appointment has been welcomed as one that will establish confidence in the management of our naval affairs, especially on account of his mastery of torpedo warfare, a branch that calls for special attention just now in view of the enemy submarine attacks on merchant and other vessels.

Admiral of the Fleet Sir Arthur K. Wilson, G. C. B., O. M., G. C. V. O., V. C., is to remain associated with the Board of Admiralty in an advisory capacity, so that we have now two officers of tried capacity at the head of affairs.

Sir Henry Jackson has at various times served on numerous technical committees in connection with the equipment and design of warships.

He is married to Alice M., eldest daughter of Mr S. H. Burbury, F. R. S., and is a member of the Naval and Military Club.—*United Service Gazette*, 6/3.

BRITISH INVENTION BOARD

LONDON, July 18.

Eminent scientists and inventors have been appointed to assist Admiral Lord Fisher, who recently was selected as chairman of the Invention Board, the duties of which will be to co-ordinate and encourage scientific work in relation to the requirements of the navy.

The board will consist of a central committee and consultants who will advise the main committee on questions referred to them. The central committee will be composed of Admiral Fisher, Sir Joseph John Thomson, Cavendish, professor of experimental physics at Cambridge University; Sir Charles A. Parsons, an expert on turbines, and Mr. George T. Beilby, chairman of the Royal Technical College at Glasgow.

The consulting panel comprises twelve eminent British scientists, subject to change or increase as occasion arises.—*N. Y. Herald*, 7/19.

THE NAVY AND THE NEW CABINET.—The Cabinet has been reconstructed with a soldier as Secretary of War, but with a civilian as First Lord of the Admiralty. No explanation has been made of this differential treatment of the two services, and, curiously enough, the matter has received little attention in the daily newspapers, which for the past fortnight have been engaged in discussing the formation of an ideal national government. *The Times*, it is true, did suggest that "one very obvious solution of the difficulty at the Admiralty, which would undoubtedly command a great popular approval, would be to place a seaman at its head." In this connection *The Army and Navy Journal* recalls the fact that at the time of almost all our greatest victories at sea there has been a sailor at the head of the Admiralty. Admiral Sir Charles Wager was there when Vernon took Porto Bello. Quiberon Bay was fought in 1759, when Admiral Lord Anson was directing our naval affairs. Rodney's victories were gained with Admiral Viscount Keppel as First Lord. Admiral Lord St. Vincent was at the head of the Admiralty at the time when Nelson bombarded Copenhagen in 1801. And again—most striking instance of all—the strategy which led up to the great victory at Trafalgar in 1805 was directed by Admiral Lord Barham. Mr. Asquith and his advisers decided not to appoint a seaman as First Lord, and consequently, while the army has a spokesman in the Cabinet, the navy is without direct representation. And

this in time of war, when it is essential that naval opinion should find expression if the best use is to be made of the fleet. It is certainly a remarkable fact that in the reconstruction of the government the importance of the navy to the nation and the empire at large should have been overshadowed by political and personal considerations.—*Naval and Military Record*, 6/2.

THE BOARD OF ADMIRALTY.—The functions of the First Lord, said the *Morning Post* on April 23, "are to act as a channel between the Government and Admiralty; to make known the needs of the Admiralty to the government, and the policy of the Government to the Admiralty. It is also within the scope of his activities to supervise the civil administration of the department, and even to give a casting vote on points where experts disagree; but our constitutional theory has no place for a civilian minister who usurps the functions of his board, takes the wheel out of the sailor's hand, and launches ships upon a naval operation." This interpretation would leave the First Lord little more than to act as a spokesman either for the Government or the Admiralty, with certain duties of a superior civil clerk and a chairman. Up to a point, the definition may be considered correct, but it is not full enough. The late Sir Vesey Hamilton, in his work on "Naval Administration," states that the First Lord, "being responsible for all the business at the Admiralty, possesses the power both of initiative and veto. By his supreme direction our maritime affairs are conducted." Elsewhere in the same book, Sir Vesey Hamilton, who had been First Sea Lord himself, says:

"He is responsible for the Admiralty as the Premier is for the Cabinet, or as the admiral commanding a fleet is responsible for that fleet. . . . If the naval advisers of the First Lord upon the board do not approve his policy, it is their responsibility to advise him, and, if their advice be not accepted, they have the remedy of protest or resignation."

It is unquestionable that there have been many instances in our past history when either the First Lord or the Premier have acted in naval affairs both without the advice of the Sea Lords and against their advice. Nor in the latter case has it always followed, or, indeed, very frequently followed, that the naval officers have resigned. They have apparently contented themselves with a protest.

As to the position of the First Lord of the Admiralty, Sir Michael Culme-Seymour, writing to the *Times* in November, 1900, said:

"A First Lord may, of course, treat the Sea Lords as his colleagues, but there is nothing more certain than that they are legally in every way his subordinates, have no responsibility whatever to the Queen and country, and that the First Lord is not *primus inter pares*, but supreme."

Even before the Order in Council of Jan. 16, 1869, when it has been said that Mr. Childers abolished the responsibility of the board, the First Lord exercised a supreme control, although this power, perhaps, was not given him by the letters patent. Sir John Dalrymple Hay, who had been a member of two Boards of Admiralty, writing also to the *Times* in November, 1900, said:

"In 1860, Sir James Graham, who had twice been First Lord, informed the Greenwich Hospital Commission, of which I was a commissioner, and he a witness, that though, out of respect to the feelings of distinguished naval officers, the Board of Admiralty was commissioned so as to give a nominal equality, in reality the decision of a First Lord prevailed."

It has, indeed, been affirmed that the Childers Order in Council of 1869 simply assumed the existence of a responsibility on the part of the First Lord, which had been decisively affirmed by the Duke of Somerset and Sir James Graham eight years before. Mr. A. H. Pollen has said very truly in the *Westminster Gazette* that the supreme command of the British Navy is the crucial question of the day, and his view is that whatever the strictly legal position of the Sea Lords may be, there is no doubt that

both the service and the public attribute a rôle to them "which is traditional." We understand him to suggest that, in accordance with this rôle, if the Sea Lords find their protests unheeded, or believe them to have been misrepresented, it is their duty to resign. If the Sea Lords really believe that their advice has been misrepresented, it may indeed become their duty to take such a step. But it is certainly not traditional, nor has it been usual, in time of war, for the Sea Lords to resign because their advice was unheeded. It is insufficient to cite latter-day instances in peace time of distinguished officers resigning, or threatening to resign, their posts at the Admiralty in these circumstances. The conditions in time of peace and of war are entirely different. Indeed, Mr. Pollen himself admits that there may be occasions when professional opinion can be overridden. He says: "There may be political considerations so serious that risks might have to be run which would not be faced for any purely military object. At such moments, the Cabinet is the only judge. If the Cabinet overrules the Admiralty, the Sea Lords can continue to serve, having done their duty by putting the military considerations before the Government." The fact is that the supreme command of the British Navy must rest eventually with the Cabinet, and nothing can take from the Cabinet, of which the First Lord is a member, this responsibility. Nor does it appear to be obligatory at the present moment, and under the provisions contained in the Order in Council appointing the board, upon the First Lord to place the opinions of his subordinates before the Cabinet unless asked to do so. He is, at the Admiralty, as Sir James Graham said, the supreme and controlling authority.—*Army and Navy Gazette*, 5/8.

NAVAL OFFICERS IN ADMIRALTY.—The appointment as from June 26 of Commander Halton S. Lecky to be naval assistant to the Fourth Sea Lord is interesting from an historical as well as a personal standpoint. All the naval members of the Board of Admiralty have now officers serving under them with the title of "Assistants," although the duties of these posts might be more fittingly described by the term "Secretaries." The growth of this system has certainly been of great benefit to the service. It has enabled the younger men to obtain experience of the working of the Admiralty Office and the duties of the board, thereby enlarging the field from which future Sea Lords might be drawn; and on the other hand it has facilitated the work of the board, and made for continuity of policy, particularly during the absence of its members. In fact, the triology of each Sea Lord working in conjunction with his civilian private secretary on the one hand and naval assistant on the other seems such a business-like and efficient arrangement that the surprising thing is it only came about in quite recent years.

To Lord Fisher must be given the chief credit for the extraordinary increase of the naval element at Whitehall during that time. The Intelligence Department grew out of all knowledge during the time he was First Sea Lord, and other branches of the administration likewise absorbed naval officers who came from sea with a knowledge of the real requirements of the service which was obviously more profound and complete than any possessed by civilians or even by the older officers at the top of the tree. The first member of the board to be allowed a naval assistant, however, was the Third Sea Lord, or controller, as he was then termed, and it is specially interesting now to remember that Admiral Sir John Jellicoe when a captain, was the first occupant of the new position, which he occupied from February, 1902, to August, 1903, serving under Sir William May. The experience thus gained must have been valuable to Sir John when he himself became controller in 1908. The practice of the First Sea Lord having a naval assistant dates from 1904, when Lord Fisher came into that office. Rear Admiral R. H. S. Bacon, then a captain, was the first occupant of the new post, which he held until he took command of the *Dreadnought*

in 1906. The Second Sea Lord was given a naval assistant in March, 1909, the first appointment to the position being the late Captain Robert Falcon Scott. Now the Fourth Sea Lord is brought into line, the increase of work in his department owing to the war being probably the immediate cause.—*Army and Navy Gazette*, 7/10.

GREECE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battle Cruisers					
Salamis	19,500	23	8 14-in., 12 6-in., 12 3-in.	Vulkan Works, Stettin	Laid down July, 1912
.....	24,000	21.5	10 14-in.	Saint Nazaire	Reported that negotiations have been completed for this ship

ITALY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Giulio Cesare ...	22,022	22	13 12-in., 18 4.7-in.	Genoa	Completed
Conte-di-Cavour	22,022	22	13 12-in., 18 4.7-in. 14 14-pdrs.	Spezia	"
Leonardo da Vinci	22,022	22	same	Genoa (Odero)	"
Andrea Doria...	22,564	23	13 12-in., 16 6-in.	Spezia	Launched March 30, 1913
Duilio.....	22,564	23	same	Castellamare	" April 24, 1913
4 ships	28,000	24	8 15-in., 16 6-in.	....	Will probably be laid down during spring and summer, 1915
Small Cruisers					
Basilicata	2,500	16.5	6 6-in.	Castellamare	Laid down Aug. 9, 1913
Campania	2,500	16.5	6 6-in.	"	" Aug. 9, 1913

NOTE.—Italy has about 15 destroyers and two submarines under construction.

ITALIAN NAVY.—With light cruisers, Italy is less well equipped in relation to her possible antagonist. Of the 16 vessels she possesses, nine are over 20 years old, with a speed of less than 20 knots; and only four have been built since the beginning of the century, the *Marsala, Nino Bixio, Quarto,* and *Libia,* the three former being 28-knot vessels armed with 4.7-inch guns, and the latter a 22-knot vessel, with 6-inch guns, which was seized while building for Turkey. Austria has among her 12 light cruisers four of the *Admiral Spaun* class, of 27 knots, or one more very fast vessel than Italy. The chances that these craft will try to emulate the exploits of the German raiding cruisers, seem to be remote, however, for, since they did not attempt anything of the kind before there was a possibility of the Italian Navy being engaged in the conflict, they are less likely to do so after.

Torpedo Craft.—At Naples, Genoa, and Leghorn there are well-equipped establishments for the building of destroyers, while at Spezia the works for submarine construction have become famous all the world over, the navies which have been supplied with designs or boats including the British. The destroyer flotilla includes 33 boats less than 15 years of age, the largest being of 689 tons, armed with one 4.7-inch and four 14-pdr. guns, and having a speed of 35½ knots. Ten more of this type should shortly be ready, if they have not already been completed. In addition, there are 67 torpedo-boats of from 120 to 200 tons.

In regard to submarines, excluding the experimental boat *Delfino*, built in 1894, there are 19 vessels, ranging from the *Glauco*, of 172 tons, 600 horse-power, and a surface speed of 14 knots, to the *Galileo Ferraris*, of 394 tons, 1200 horse-power, and a surface speed of 18 knots. The majority of the boats have two tubes, but in addition to these the *Nautilus* and *Nereide*, of 207 tons and 19 knots, have one movable tube; and in the two latest boats there are four tubes.

The following table shows the armored ships of the Italian Navy:

Name	Displacement	Date	Armament
Dreadnoughts			
Andrea Doria	23,025	1913	13 12-in., 16 6-in.
Cato Duilio	23,025	1913	13 12-in., 16 6-in.
Giulio Cesare	20,010	1911	13 12-in., 18 4.7-in.
Leonardo da Vinci	20,010	1911	13 12-in., 18 4.7-in.
Conte di Cavour	20,010	1911	13 12-in., 18 4.7-in.
Dante Alighieri	20,010	1910	12 12-in., 20 4.7-in.
Pre-Dreadnoughts			
Roma	12,425	1907	2 12-in., 12 8-in.
Napoli	12,425	1905	2 12-in., 12 8-in.
Regina Elena	12,425	1904	2 12-in., 12 8-in.
V. Emanuele III	12,425	1904	2 12-in., 12 8-in.
Benedetto Brin	13,207	1901	4 12-in., 4 8-in.
R. Margherita	13,207	1901	4 12-in., 4 8-in.
A. di Saint Bon	9,645	1897	4 10-in., 8 6-in.
E. Filiberto	9,645	1897	4 10-in., 8 6-in.
Sicilia	13,085	1891	4 13.5-in., 8 6-in.
Sardegna	13,640	1890	4 13.5-in., 8 6-in.
Re Umberto	13,825	1888	4 13.5-in., 8 6-in.
Armored Cruisers			
San Giorgio	9,680	1908	4 10-in., 8 7.5-in.
San Marco	9,680	1908	4 10-in., 8 7.5-in.
Amalfi	9,980	1908	4 10-in., 8 7.5-in.
Pisa	9,980	1907	4 10-in., 8 7.5-in.
F. Ferruccio	7,234	1902	1 10-in., 2 8-in.
Varese	7,234	1899	1 10-in., 2 8-in.
G. Garibaldi	7,234	1899	1 10-in., 2 8-in.
Carlo Alberto	6,396	1896	12 6-in., 6 4.7-in.
Vettor Pisani	6,396	1895	12 6-in., 6 4.7-in.
Marco Polo	4,511	1892	6 6-in., 10 4.7-in.

Regarding the construction program of Italy, not much information is to hand beyond that already given, but it should be noted that her authorities have had time to profit by the experience of the war, and no doubt they have made good use of the opportunity thus afforded her.—*London Times*, 5/21.

JAPAN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Fuso	31,300	22.5	12 14-in., 16 6-in.	Kure	Launched Mar. 28, 1914
Fuso 2d	31,300	22.5	....	Kawasaki	Date when these ships will be laid down has not yet been settled
Fuso 3d	31,300	22.5	....	Mitsubishi	
Fuso 4th	31,300	22.5	....	Yokosuka	Laid down Nov. 20, 1913
Battle Cruisers					
Hiyei	27,500	27	8 14-in., 16 6-in., 8 t. t.	Yokosuka	Commiss'd Mar. 31, 1914
Haruna	27,500	27	same	Nagasaki	Launched Dec. 14, 1913
Kirishima	27,500	27	same	Kobe	" Nov. 30, 1913

NOTE.—Japan has two destroyers and two submarines under construction in England and France respectively.

NETHERLANDS

DUTCH VOTE FUNDS TO BUILD UP NAVY.—Fast cruisers and submarines are to form the bulk of the additions to the Dutch Navy in 1916, according to the naval budget. The Minister of Marine obtained the consent of Parliament to begin the building of two new cruisers and four submarines of the biggest type at once, while he was authorized to purchase a number of hydroaeroplanes.

The cruisers are to have a speed of 30 knots, and to possess a steaming radius of 5000 miles at a minimum speed of 12 knots. They are to displace 6000 tons, and to cost $3,600,000 each, and are to be built in Holland under the supervision of a foreign firm. They are to be armed with ten 6-inch quick-firing guns, four 3-inch semi-automatic quick-firers arranged for use as anti-airship weapons, and four machine guns. The armor belt is to be of 3-inch plates, and the decks also are to be protected all over, while their bridges and ammunition hoists are to be reinforced by steel. Turbine engines are to be used, and liquid fuel to be burned.

Each of the four new submarines is to displace 800 tons, and to have six torpedo-tubes. The cost of each is estimated at $700,000.

The new hydroaeroplanes (six in number) are to cost $8000 each, and are to be purchased abroad.

The reason big battleships were not provided for was that in case Holland should be drawn into the war the Dutch fleet would be compelled to adopt the principle of strategical defensive, reinforced by an occasional offensive by the submarines, whose presence would make the North Sea perilous for any enemy warcraft. The Dutch colonies in the East Indies also could be placed in an excellent state of defence by means of submarines, fast cruisers, and destroyers.

THE DUTCH NAVY.—The report from The Hague that the Dutch coast defence battleship *Heemskerck* has been ordered home from Curaçao will serve to direct attention to the navy of Holland, particularly as there is still a possibility that it may have to take a part in the present conflict. As everyone knows, the Dutch fleet has a considerable and an illustrious history behind it. To-day the navy of the Netherlands does not compare, of course, with those of the great powers like France and Germany, in regard to material strength, but with the single exception of Sweden it is the largest of the minor fleets. It has seven coast defence ironclads on the effective list, of which the largest is of 6530 tons and carries two 11-inch guns, and the smallest of 3520 tons with three 8.2-inch guns, all the others having two 9.4-inch guns. The speed of the squadron is about fourteen knots. There are also some half dozen small cruisers, several gunboats, and from thirty to forty torpedo craft, including a group of eight destroyers built by Messrs. Yarrow within the last five years. Such submarines as are completed are of the coastal type. The uses to which this little fleet might be put in case of a conflict, do not, therefore, open up a wide field for speculation. The small draft of many of the vessels ought, however, to be an advantage in certain respects, as has been shown by the operations of the British flotilla off the Belgian coast.—*Army and Navy Gazette*, 5/15.

NORWAY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Small Cruisers					
Bjorgvin	5000	16.5	2 9.4 in., 4 6-in., 6 4-in.	Messrs. Armstrong	Laid down Jan. 8, 1913
Nidaros	5000	16.5	same	same	Launched June 9, 1914

NOTE.—Norway has four submarines under construction. (Vessels building in England have been taken over as a war measure.)

PORTUGAL

The Portugese Government has recently taken delivery of the ocean-going destroyer *Liz*, built by Messrs. Gio. Ansaldo & Co., of Genoa. The dimensions of this vessel are 331.3 feet by 22 feet by 7 feet, and the loaded displacement is 600 tons. The armament consists of four 3-inch guns and three 18-inch torpedo-tubes. Six torpedoes are carried, three in tubes and three in reserve. The vessel also carries 130 tons of liquid fuel, giving her a radius of 3500 miles at 13 knots. The maximum speed is 30 knots.—*Shipbuilder*, June.

RUSSIA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Sevastopol	23,026	23	12 12-in., 16 4.7-in.	Baltic Works	Launched June 29, 1911
Petropavlovsk.	23,026	23	same	" "	" Sept. 9, 1911
Poltava.....	23,026	23	same	New Admiralty	" July 10, 1911
Gangut	23,026	23	same	" "	" Oct. 7, 1911
Emperor Alexander III	22,435	21	12 12-in., 20 4.7-in.	Nikolaieff	" Apr., 1914
Empress Marie	22,435	21	same	Ivan Bunge Co.	" Nov. 3, 1913
Catherine II...	22,435	21	same	" " "	Laid down Sept. 1, 1912
Battle Cruisers					
Ismailia.....	32,200	28	12 14-in., 21 5.1-in.	Galerni	" Dec. 19, 1912
Kinburn.....	32,200	28	same	Baltic Works	same
Borodino.....	32,200	28	same	Galerni	same
Navarino.....	32,200	28	same	Baltic Works	same
Small Cruisers					
Adm. Butakow	7,500	32	15 5.1-in.	Putilow, St. Petersb.	Laid down Nov. 29, 1913
Adm. Spiridov.	7,500	32	same	" "	" Nov. 29, 1913
Svietlana.....	7,500	32	same	Neval	" Dec. 7, 1913
Adm. Grieg....	7,500	32	same	"	" Dec. 7, 1913
Muravjev Amurski	4,500	..	8 5.1-in.	Elbing	Launched Apr. 11, 1914
Adm. Nevelskoj	4,500	..	same	"	Laid down Feb. 13, 1913
" Lazarev...	7,500	32	15 5.1-in.	N. F. & W. Nikolaieff	" Oct. 19, 1913
" Nachimow	7,500	32	.....	R. S. Co. "	same

NOTE.—Russia has about 45 destroyers and 19 submarines under construction or contract.

WORK OF RUSSIAN NAVY.—The Russian Navy has so far received scant recognition for the good work it has done in the war. Although not responsible for its strategical position, it is so placed as to make a very unpleasant neighbor for Germany, while in its actual work afloat it has surpassed anything we had any good reason to expect. So far only two actions between the surface ships of Germany and Russia in the Baltic have been recorded. In the first, fought at the end of August, the German cruiser *Magdeburg* was driven ashore and destroyed; in the second, which occurred last Friday, the minelayer *Albatross* met with a similar end. Besides these, Germany has lost in the Baltic the armored cruiser *Friedrich Karl*, mined, and a Parseval airship, in addition to a number of torpedo-craft. Russia has lost only the armored cruiser *Pallada* and the minelayer *Yenesei*, both of which were torpedoed by a submarine. In action, the Russian personnel has shown itself dependable and efficient, and imbued with a spirit of devotion to duty that would be a credit to any navy. A great deal of the credit for this state of affairs must be given to Vice Admiral Grigorovitch, who became Minister of Marine four years ago. He won over the Duma to the cause of naval development, and reorganized the whole of Russia's naval affairs, from dealings with contractors to the training of the seamen. Russia is infinitely weaker than Germany at sea; but there are probably few people who realize that at the outbreak of war our northern Ally had eleven dreadnoughts in hand—eight on the Baltic and three on the Black Sea. Of the former the first four are by this time probably in commission; they are 23-knot ships of 23,000 tons, carrying twelve 12-inch guns apiece. The other four Baltic ships are 32,200-ton battle-cruisers designed to carry an armament of twelve 14-inch.—*Naval and Military Record, 7/7.*

SPAIN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Espana.....	15,450	19.5	8 12-in., 20 4-in.	Ferrol	Commiss'd Oct. 23, 1913
Alfonso XIII..	15,450	19.5	same	"	Launched May 7, 1913
Jaime I.....	15,450	19.5	same	"	Laid down Feb. 5, 1912

NEW SPANISH SUBMARINE.—It is reported that an order for a 750-ton submarine for the Spanish Navy has been received by the Fore River Shipbuilding Corporation. She will have a speed of 18 knots on the surface, and 11 knots submerged. She will be equipped with torpedo-tubes and rapid-fire guns, and will correspond to the *M* type of submarines now building for the United States Navy.—*Shipping Illustrated*, 7/17.

SWEDEN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Small Cruiser					
Sverige.....	7100	22.5	4 11-in., 8 5.4-in.	Gothenburg	Laid down Feb. 15, 1913

A bill has passed the Swedish Riksdag appropriating 2,000,000 crowns ($536,000) for the purchase of submarines for the use of the navy.—*Shipping Illustrated*, 6/19.

TURKEY

THE TURKISH AMMUNITION SUPPLY.—We have all been wondering whence the Turkish troops which are operating in the Gallipoli Peninsula, in Mesopotamia, and on the Caucasian border, have drawn their munitions, for the threefold war which they have so stoutly, if not particularly successfully, been waging. We know that their own sources of production were practically negligible, that very little could have reached them by sea prior to their entering upon war, and that only comparatively limited quantities of ammunition have been able to arrive at Constantinople for distribution, by means of the good offices of the German Government and the complacency of certain of the neutrals. But the Turks have managed to put up a good fight wherever the Allies have met them, and such defeats as they have experienced have not been conspicuously due to any failure in supplies of shells for guns or cartridges for small arms. It now transpires in a telegram from Athens that Messrs. Krupp have recently established near Constantinople a large factory for shells and explosives, employing four thousand workmen, and which is turning out large quantities of ammunition of all descriptions, while the manufacture of saltpetre is also proceeding by the new electrical process. Thus we have further proof of the remarkable pre-war preparations of Germany: a factory of this kind cannot be set

up at short notice in such a country as Turkey, where everything would have to be made *ab initio;* while the fact that Germany can still spare four thousand operatives to Turkey at the very moment when, as we have all been ever ready to believe, her own needs were becoming acute, shows that she still possesses a great reserve of strength, both manufacturing and military. We may also take it that such a factory, employing so many men, would hardly have been established had the Germans not been able amply to supply it with all the chemicals, products, and appliances for keeping it in going order for some considerable time, long enough to supply all the munition requirements of the Turkish forces to an extent which Germany, best of all belligerents, has been able accurately to foresee.—*Army and Navy Gazette,* 6/12.

UNITED STATES

EDISON BATTERY FOR "E 2."—The Navy Department has contracted with Thomas A. Edison to install his storage battery on the submarine *E 2* and that vessel will be so equipped sometime during July.—*Marine Journal,* 5/15.

The U. S. submarine *E 2,* of the Holland type, has developed engine trouble, due to the blowing out of her armature, and extensive repairs will have to be made, which will necessitate her going to New York for rewinding of her motor strands. The fact in itself is not uncommon in submarine engines.—*Shipping Illustrated,* 6/19.

"G 3" TRIALS

BRIDGEPORT, July 16.

The first American submarine to meet tests designed to prove that it could cross the Atlantic Ocean and return without stopping, to-day completed trials on Long Island Sound, showing it has a cruising radius of more than 6000 miles. The submarine is the *G 3,* built by the Lake Torpedo-boat Company of Bridgeport.

The *G 3* is only 160 feet in length. The seven new Lake boats being constructed for the United States Navy will be more than 350 feet in length, and will have a much greater radius of activity than the *G 3.*

The engines for the *G 3,* which are of 1200 horse-power, were imported from Switzerland, but American firms will in the future be able to make the machines. The engines were installed in the *G 3* at the Brooklyn Navy Yard about two weeks ago, and the tests which culminated to-day have been carried on in Long Island Sound under the supervision of naval officers. The *G 3* showed a cruising radius of 5500 miles at the top speed of 11 knots, and at approximately 8 knots a radius of more than 6000 miles. The tests showed that the *G 3* should make 14.7 knots an hour on the surface and 10.7 knots submerged, when under pressure. The *G 3* cost $450,000.

WASHINGTON, July 16.

The most important fact about the *G 3,* as demonstrated by the tests, is that her engine, which is of the new Sulzer-Diesel type, is a success. The Navy Department sent naval officers to Winterkuhr, Switzerland, to help build a heavy oil engine adapted to the submarine, and after two years of disappointment this first completed engine has apparently achieved a triumph. The engine is to be placed in all Lake boats, of which nine are under contract.

Rear Admiral Robert S. Griffin, Chief of the Bureau of Steam Engineering, said to-night that while no official reports of the tests had reached the department, he was satisfied with the new engine, and had no doubt that the *G 3* possessed a sailing radius of 6000 miles. The use of water tanks for oil storage, a feature of the boat design, is the main expedient that secured such a long radius.—*N. Y. Times,* 7/17.

NAVY DEPARTMENT
BUREAU OF CONSTRUCTION AND REPAIR

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY, JULY 10, 1915

Name, type and no. of vessels	Contractor	Per cent of completion			
		July 1, 1915		June 1, 1915	
		Total	% on ship	Total	% on ship
Battleships					
36 Nevada	Fore River S. B. Co.	94.2	93.7	92.8	92.2
37 Oklahoma	New York S. B. Co.	96.6	96.6	94.3	94.3
38 Pennsylvania	Newport News S. B. Co.	81.5	77.6	79.3	75.1
39 Arizona	New York Navy Yard	66.8	62.6	63.6	59.3
40 California	New York Navy Yard	0.0	0.0	.....	.....
41 Mississippi	Newport News S. B. Co.	23.4	8.1	20.4	.....
42 Idaho	New York S. B. Co.	32.1	17.8	29.0	13.8
Destroyers					
53 Winslow	Wm. Cramp & Sons	95.9	95.9	93.0	93.0
55 Cushing	Fore River S. B. Co.	98.1	98.1	95.3	95.3
56 Ericsson	New York S. B. Co.	99.5	99.5	99.1	99.1
57 Tucker	Fore River S. B. Corporation	76.3	73.4	69.7	66.3
58 Conyngham	Wm. Cramp & Sons	78.3	77.0	70.1	68.2
59 Porter	Wm. Cramp & Sons	72.5	70.9	68.9	66.9
60 Wadsworth	Bath Iron Works	97.8	97.8	94.2	94.2
61 Jacob Jones	New York S. B. Co.	80.7	80.5	74.2	73.8
62 Wainwright	New York S. B. Co.	80.2	80.0	72.7	72.3
63	Fore River S. B. Corporation	29.2	22.8	24.4	17.2
64	Fore River S. B. Corporation	28.6	22.2	24.1	16.9
65	Bath Iron Works	24.0	17.5	15.9	7.7
66	Bath Iron Works	22.6	15.9	15.7	7.4
67	Wm. Cramp & Sons	13.1	5.5	9.8	3.0
68	Mare Island Navy Yard	4.0	3.7	2.8	.....
Destroyer Tenders					
2 Melville	New York S. B. Co.	96.7	96.7	92.6	92.6
Submarines					
27 G-2[1]	Lake T. B. Co. (Bridgeport)	89.7	89.7	89.7	89.7
31 G-3[1]	Lake T. B. Co. (Bridgeport)	88.6	88.4	88.6	88.4
40 L-1	Electric Boat Co. (Quincy)	98.3	98.3	96.6	96.6
41 L-2	Electric Boat Co. (Quincy)	98.4	98.4	97.4	97.4
42 L-3	Electric Boat Co. (Quincy)	92.7	92.7	91.2	91.2
43 L-4	Electric Boat Co. (Quincy)	91.9	91.9	91.0	91.0
44 L-5	Lake T. B. Co. (Bridgeport)	72.4	67.9	70.8	66.6
45 L-6	Lake T. B. Co. (Long Beach, Cal.)	63.4	59.8	61.0	56.1
46 L-7	Lake T. B. Co. (Long Beach, Cal.)	61.7	57.2	59.4	53.9
47 M-1	Electric Boat Co. (Quincy)	78.8	74.2	76.3	71.4
48 L-8	Portsmouth, N. H., Navy Yard	38.7	34.0	32.9	30.7
49 L-9	Electric Boat Co. (Quincy)	73.1	68.5	70.2	64.2
50 L-10	Electric Boat Co. (Quincy)	71.0	65.0	68.0	61.0
51 L-11	Electric Boat Co. (Quincy)	62.5	55.2	57.8	48.6
52	Electric Boat Co. (Quincy)	0.0	.....	.....	.....
53 N-1	Electric Boat Co. (Seattle)	0.0	.....	.....	.....
54 N-2	Electric Boat Co. (Seattle)	0.0	.....	.....	.....
55 N-3	Electric Boat Co. (Seattle)	0.0	.....	.....	.....
56 N-4	Lake T. B. Co. (Bridgeport)	24.7	22.2	20.1	17.2
57 N-5	Lake T. B. Co. (Bridgeport)	24.1	21.5	18.0	14.9
58 N-6	Lake T. B. Co. (Bridgeport)	23.5	20.8	17.5	14.5
59 N-7	Lake T. B. Co. (Bridgeport)	23.4	20.8	17.6	14.4
Submarine Tenders					
2 Bushnell	Seattle Construction & D. D. Co.	91.5	89.2	90.2	85.5
Fuel Ships					
14 Maumee	Mare Island Navy Yard	94.4	93.8	91.9	91.3
15 Cuyama	Mare Island Navy Yard	0.0	0.0	.....	.....
Miscellaneous					
Supply Ship No. 1	Boston Navy Yard	16.1	11.9	14.5	8.0
Transport No. 1	Phila. Navy Yard	16.3	9.0	14.7	7.7
Pan. Canal Colliers					
Achilles	Maryland Steel Co.	Del'v'd	6-10-15	98.3	98.2

[1] Contracts forfeited, vessels being completed New York Yard.

AMERICAN SUBMARINE MACHINERY ABROAD.—The Austrian submarine *U 5*, which sank the French cruiser *Leon Gambetta* recently, was built by the Whitehead Company at Fiume, in 1910, and the motors, engines and other important machinery by the Electric Boat Company of New London, Conn., which also supplied the plans for and supervised the construction of the hull. This vessel and her sister boat, *U 6*, are of the same displacement, speed and radius as the five U. S. submarines of the *C* class. As the cruiser was torpedoed approximately 300 miles away from the submarine's base, the work of the *U 5* illustrates the enormous value of the mobility possessed by even the smaller and older of our submarines. The U. S. *C* class of submarines were formerly known as the *Stingray, Tarpon, Bonita* and *Snapper*, and were authorized in 1906.—*Marine Journal*, 5/15.

The U. S. destroyer *Wainwright* was launched at the New York Shipbuilding Co., Camden, N. J., June 12. The principal dimensions are as follows:

Length bet. perp.	310 ft.
Length over all	315 ft. 3 in.
Breadth, molded	29 ft. 10 in.
Breadth, extreme	30 ft. 6½ in.
Depth, molded	17 ft. 7½ in.
Trial displacement	1150 tons
Draft, mean	9 ft. 8½ in.
Speed on trial	29½ knots
Fuel oil capacity	290 tons
Shaft horse-power	17,000

She will be armed with four 4-inch 50-cal. rapid-fire guns and four 21-inch twin torpedo tubes; deck mounting. The vessel is propelled by twin screws, driven by Parsons turbines, with geared turbines for cruising. Steam is supplied by four Thornycroft Express type watertube boilers, fitted for burning oil fuel, four smokestacks, two masts, wireless telegraph and two 30-inch searchlights are fitted. Accommodations are provided for a complement of 100, consisting of 5 commissioned officers, 8 petty officers and 87 men.—*Shipping Illustrated*, 6/19.

ADVISORY BOARD ON NAVAL INVENTIONS.—Within a few weeks at the most Mr. Daniels, Secretary of the Navy, hopes to announce the personnel and organization of the new Advisory Board on Naval Inventions, of which Thomas A. Edison will act as chairman.

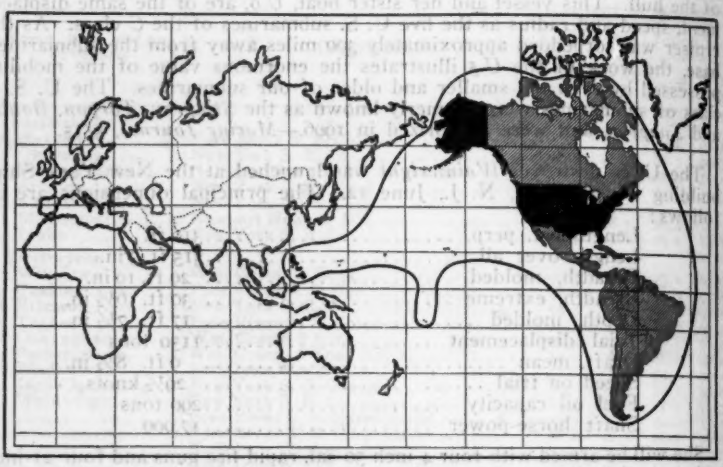
The influence of the European conflict in increasing inventions for war purposes has been felt within the United States as well as the belligerent countries and the new Advisory Board will have a mass of data for its consideration as soon as it can start work.—*N. Y. Herald*, 7/14.

In addition to Mr. Edison as chairman, the board will include Mr. Ford, Mr. Orville Wright, and sixteen men of science, two of whom shall be selected by each of eight American scientific societies, such as the Associations of Civil, Electrical, and Mechanical Engineers, the Inventors' Guild, and the recently organized American Society of Aeronautic Engineers. It is understood that the duties of the board will be purely advisory in character, to assist the work of the departmental bureaus.

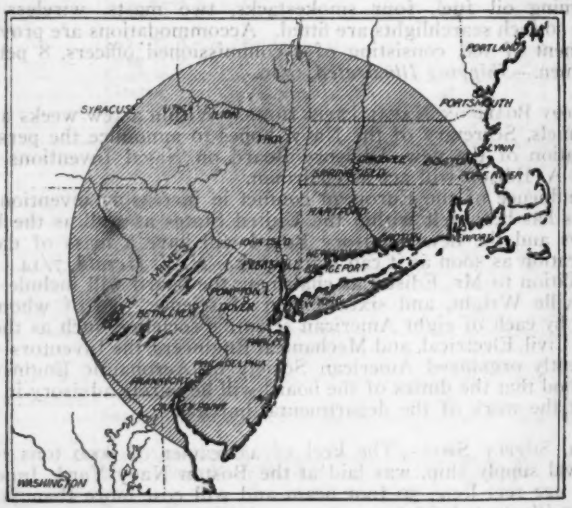
NAVAL SUPPLY SHIP.—The keel of a steamer of 8000 tons to be used as a naval supply ship, was laid at the Boston Navy Yard, June 12. She is to be 422 feet long, 50 foot beam and will cost more than $1,000,000.—*Shipping Illustrated*, 6/19.

MERCHANT MARINE TONNAGE INCREASE.—The tonnage increase of the American merchant marine up to May 1 of the fiscal year 1915 amounted to 1019 vessels of 680,155 gross tons, according to a report made recently by the Bureau of Navigation, Department of Commerce. This is

a greater increase than has been recorded for any previous year. In 1907, 596,708 gross tons were added to the American registry, and previous to that the record had been held by the year 1855, when an increase of 586,102 gross tons was recorded.—*Nautical Gazette*, 6/24.



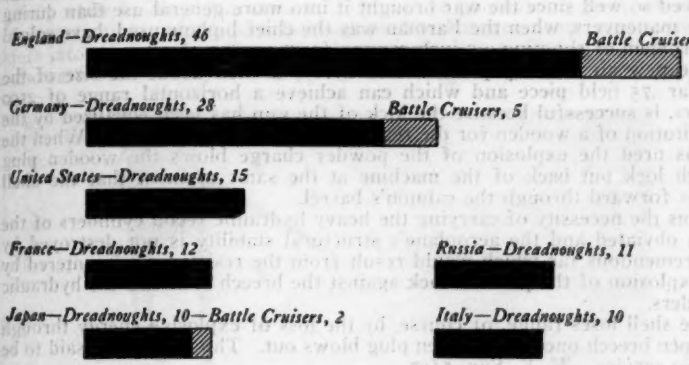
THE VAST TERRITORY THAT THE MONROE DOCTRINE OBLIGATES US TO DEFEND



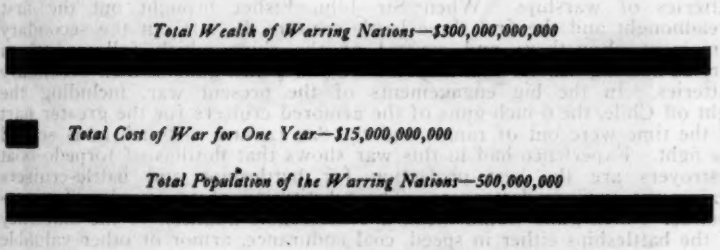
THE HEART OF AMERICA

Within a circle of 170 miles radius drawn around Peekskill, N. Y., are embraced New York City, Boston, Philadelphia, and many other important cities; also most of the manufactories of armaments and war materials, together with the principal coal fields of Pennsylvania.

Battle Ship Strength of the Nations



Enormous Resources of the Warring Nations


Total Wealth of Warring Nations—$300,000,000,000
Total Cost of War for One Year—$15,000,000,000
Total Population of the Warring Nations—500,000,000
Estimated Total Killed and Wounded during first year of present war, based on first six months—4,000,000—less than birth rate by 1,000,000
Estimated Total Killed in one year—800,000—one-sixth the birth rate

From "Defenseless America" in *The Navy*, May, 1915.

CORRECTION.

On page 547, March-April, 1915, appeared under the heading "Mare Island Navy Yard Dilatory" a quotation from the *Marine Journal*. We are informed that the statements therein are misleading, the facts being these:

As far as the Navy Yard, Mare Island, is concerned, it has materially anticipated the contract time on the *Kanawha*, with a saving of over $150,000 under the estimate, and will be well within the contract time on the *Maumee*, with an estimated saving of at least $75,000 on the work performed by that yard.

ORDNANCE

GUNS ON AEROPLANES THROW 3-INCH SHELLS.—Experiments undertaken at Issy les Moulineaux with the new Voisin military biplane, which has behaved so well since the war brought it into more general use than during peace maneuvers, when the Farman was the chief biplane used, have solved the problem of shooting a 3-inch cannon from an aeroplane.

The new air artillery piece, which shoots a shell about the size of the regular .75 field piece and which can achieve a horizontal range of 2500 meters, is successful because the kick of the gun has been equalized by the substitution of a wooden for the regular heavy steel breech lock. When the gun is fired the explosion of the powder charge blows the wooden plug breech lock out back of the machine at the same moment that the shell jumps forward through the cannon's barrel.

Thus the necessity of carrying the heavy hydraulic recoil cylinders of the .75 is obviated and the aeroplane's structural stability is not destroyed by the tremendous jar which would result from the resistance encountered by the explosion of the powder back against the breech lock and the hydraulic cylinders.

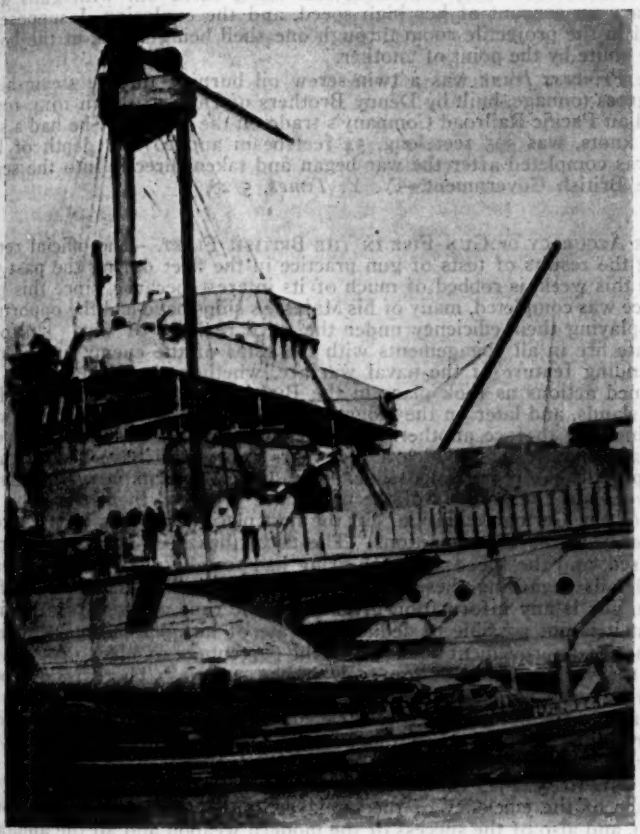
The shell loses range, of course, by the loss of explosive energy through the open breech once the wooden plug blows out. The new gun is said to be now in service.—*N. Y. Sun*, 5/17.

SIX-INCH GUNS ON BATTLESHIPS.—The fact that all the naval engagements between the larger ships have been fought with heavy-caliber guns at the longest ranges at which these guns could be used with effect, has once more brought to the front the perennial question of the secondary batteries of warships. When Sir John Fisher brought out the first dreadnought and the first three battle-cruisers, he left out the secondary armament altogether; and several of the ships which followed them carried nothing heavier that 12-pounders and 4-inch guns in their secondary batteries. In the big engagements of the present war, including the fight off Chile, the 6-inch guns of the armored cruisers for the greater part of the time were out of range, and the 8.2, 12, and 13.5-inch guns settled the fight. Experience had in this war shows that flotillas of torpedo-boat destroyers are the best protection for battleships and battle-cruisers against the enemy's destroyers. The substitution of 12-pounders for 100-pounder 6-inch guns would mean a considerable addition to the efficiency of the battleships either in speed, coal endurance, armor or other valuable qualities.—*Scientific American*, 5/15.

A WAR OF ARTILLERY.—The present struggle in Europe is a war of artillery; to the side which can produce a preponderance of artillery and an excess of ammunition supplies the victory will belong, other things being equal. Only those who are present on the battlefields of Europe can form any adequate idea of the enormous expenditure of ammunition, and particularly of ammunition for field guns and howitzers, which is taking place. In the House of Commons, the chancellor of the Exchequer recently stated that during the battle of Neuve Chapelle as much ammunition was expended as was used during the entire Boer war, which latter lasted for two years and nine months. The Neuve Chapelle battle front covered only a few miles, whereas the whole fighting front in all the theaters of the present war must total fully 1500 miles.—*Scientific American*, 5/15.

NEW AUSTRIAN MORTAR.—It is reported that the Austrian troops used a new battery of 52 cm. (20.5-inch) mortars in the fighting round Tarnow. The first shot from one of these guns entirely destroyed a large tower at a distance of eleven miles. The shell weighs over a quarter of a ton more than that of the German 17-inch mortars.—*Army and Navy Gazette*, 5/29.

Since the beginning of the war, the British Navy which had heretofore enjoyed remarkable freedom from accidents due to premature explosion of service charges has had a battleship blown up in the Thames, the *Bulwark*, and more recently an auxiliary ship, the *Princess Irene* was blown to atoms while loading ammunition. The above photograph gives an idea of the precautions adopted in loading cordite charges from ammunition lighters into a battleship. It was while performing a similar operation that the *Bulwark* was destroyed.—*Shipping Illustrated*, 6/19.



HOISTING CORDITE CHARGES ON A BRITISH BATTLESHIP

NAVAL OFFICER ASSUMES CARELESS HANDLING OF AMMUNITION.—Naval reserve officers who were asked last night for an opinion as to the cause of the blowing up of the *Princess Irene* said that it might have been an accident similar to that which happened to the battleship *Bulwark*, which was blown to pieces at Sheerness, on November 26, with a loss of 800 lives. The *Bulwark* was taking on ammunition at the time and the official investigation by the Admiralty stated that the blowing up was due to ar. explosion in the powder magazine. A naval reserve commander said last night that in the unofficial opinion of the naval officers he had met, the

loss of the battleship was due to carelessness on the part of the men employed in loading the shells on board.

"They are directed to place each projectile in a leather jacket before putting it into the canvas chute that leads down into the powder magazine," he said. "The loss of so many thousands of men in the war has resulted in a reckless disregard of human life, and instead of protecting the shells with these jackets the men just throw them in one after the other, in spite of the cautions given them.

"The *Princess Irene*, I assume, was being fitted out with guns as an auxiliary on account of her high speed, and the explosion, I suppose, occurred in the projectile room through one shell being struck at the bottom of the chute by the point of another."

The *Princess Irene* was a twin-screw oil burning turbine steamship of 6000 gross tonnage, built by Denny Brothers of Dumbarton, in 1914, for the Canadian Pacific Railroad Company's trade on the Pacific. She had a speed of 24 knots, was 395 feet long, 54 feet beam and 20 feet depth of hold. She was completed after the war began and taken directly into the service of the British Government.—*N. Y. Times*, 5/28.

THE ACCURACY OF GUN-FIRE IN THE BRITISH FLEET.—The official returns giving the results of tests of gun practice in the fleet during the past year, issued this week, is robbed of much of its interest, because, since this peace practice was completed, many of his Majesty's ships have had the opportunity of displaying their efficiency under the stern realities of war. Uniformly accurate fire in all engagements with the ships of the enemy has been the outstanding feature of the naval warfare, whether regard be had to such combined actions as took place in the Bight of Heligoland, off the Falkland Islands, and later on the Dogger Bank, or in individual actions, where one ship had to face another. This accuracy of fire was in many cases associated with ranges which a few years ago would have been regarded as impracticable, if not impossible. The annual returns now issued show, however, how the gunners of the navy have prepared themselves for "the day" of the German ambition. In the first place, there has been a greater stringency in the test conditions. The target has been reduced, the range increased, and the speed at which firing had to take place was augmented. The details regarding these three points are not disclosed in the official return, nor is any information given as to the time allowed for the firing, so that it is not possible to deduce the rate of hits per minute. Sufficient evidence of improvement is shown in the percentage of hits to rounds fired from the various types of gun now in the service. There is, of course, no information regarding the 15-inch gun, the ships carrying which have only entered the fleet since the war began. The 13.5-inch gun was used for the first time in 1912 when the percentage of hits to rounds fired was 58 per cent. In the following year this had increased to 66.66 per cent, and in 1914 to 85.43 per cent. It must be admitted that we have here not only evidence of the efficiency of the gunlayer, but of the modern gun-control system, and also of the success of the modern weapon and all the appliances placed by the manufacturer at the disposal of the gun crew. The later 12-inch guns continue to show a percentage between 52 and 55 per cent of hits to rounds fired. The latest 6-inch breech-loading gun, which is extensively used in the later battleships, also shows improvement. In 1911-12 the percentage of hits to rounds fired was only 49; in 1913 it increased to 53.21, and in 1914 to 54.75. It should be remembered that the target is very much smaller than the enemy's ship would be, so that one can understand that if in practice, under all conditions of weather, such a percentage is attained, the results will be even better in actual war. The 4-inch breech-loader has also a percentage exceeding 50 per cent, as is the case also with the 4.7-inch quick-firer.—*Engineering*, 5/21.

NAVAL GUNNERY.—*Results of Gunlayers' Tests in 1914.*—As reported at the close of May, the results of gunlayers' tests with heavy guns and light quick-firing guns in 1914 have been issued. The following abstracts, giving the ships in order of merit, will be of interest:

HEAVY GUNS

Fleet or Squadron	No. of ships	No. of men firing	Average points	First ship in the fleet or squadron	Points
2d Battle Sq.	2	20	129.62	Audacious	140.25
China Sq.	2	18	100.92	Yarmouth	104.17
Mine Laying Sq.	3	11	95.36	Naiad	133.33
1st Battle Cr. Sq.	1	8	91.87	New Zealand	91.87
Fleet Flagship	1	22	87.86	Iron Duke	87.86
1st Light Cr. Sq.	3	22	84.26	Birmingham	100.00
Mine Sweeping Gunboats	4	8	83.33	Jason	133.33
2d Cruiser Sq.	1	14	81.71	Shannon	81.71
5th Cruiser Sq.	2	18	77.08	Falmouth	79.16
1st Battle Sq.	3	24	74.50	St. Vincent	99.75
4th Cruiser Sq.	1	12	72.92	Essex	72.92
5th Battle Sq.	6	86	71.60	Bulwark	100.00
S. E. and W. Coast of America	1	12	69.44	Glasgow	69.44
Depôt Ships and Flotilla Cruisers	8	58	63.58	Vulcan	91.66
3d Cruiser Sq.	2	19	59.07	Devonshire	81.48
Mediterranean Fleet.	1	8	59.06	Indomitable	59.06
Sp. Service Vessels	2	8	17.50	Alert	17.50
Totals	43	368	75.93		
Training Sq.	5	60	44.12	Crescent	90.13

LIGHT Q. F. GUNS

Fleet or Squadron	No. of ships	No. of men firing	Average points	First ship in the fleet or squadron	Points
6th Battle Sq.	1	24	113.33	Lord Nelson	113.33
Mediterranean Fleet—					
1st Cruiser Sq.	1	20	107.66	Duke of Edinburgh	107.66
4th Cruiser Sq.	1	8	95.62	Essex	95.62
4th Battle Sq.	2	48	93.85	Agamemnon	100.34
China	2	36	85.67	Minotaur	108.02
2d Cruiser Sq.	4	86	80.86	Cochrane	112.15
3d Cruiser Sq.	4	80	80.35	Devonshire	106.08
5th Battle Sq.	7	96	80.08	Irresistible	106.25
Flotilla Cruisers and Depôt Ships	5	33	75.35	Amethyst	136.19
5th Cruiser Sq.	1	20	71.25	Carnarvon	71.25
Mine Sweeping Gunboats	4	16	62.29	Skipjack	108.33
3d Battle Sq.	1	24	56.32	Hibernia	56.32
Sp. Service Vessels	2	8	59.38	Alert	75.83
East Indies	1	14	34.40	Swiftsure	34.40
Cape of Gd. Hope	..	..	....		
S. E. and W. Coast of America	..	..	....		
Australian Fleet	..	..	....		
N. Zealand Div.	..	..	....		
Totals	36	513	81.06		

Destroyers and Torpedo-Boats.—The result of the gunlayers' test for destroyers and torpedo-boats of his Majesty's fleet in 1914 was published on Saturday by the Admiralty, the detailed returns being prefaced by a note stating that the award of the medal will be promulgated in due course. Of the 126 ships which fired 538 guns, all except one were destroyers. The number of hits in scoring time was 1274, and the number of misses 1342, the percentage of direct hits to rounds fired being 48.7000, as compared with 47.342 in 1913. Lists giving details of the results obtained with the various types of guns by each ship (arranged in order of merit), are headed by the following:

4-inch B. L. VIII and 4-inch Q. F. IV (scoring time, 46 sec.)—*Goldfinch*, 2nd flotilla, with 10 hits in 12 rounds in scoring time. Best shot in ship, Petty Officer F. M. Dowell.

12-pounder, P. V. and P. IV mountings (scoring time, 32 sec.)—*Nemesis*, 2d flotilla, with 10 hits in 12 rounds. Best shot, Leading Seaman S. Lammerton.

12-pounder 12 cwt. P. I. mounting (scoring time, 39 sec.)—*Stour*, 9th flotilla, with six hits in six rounds. Best shot, Leading Seaman A. Hughes.

12-pounder, 8 cwt. (scoring time, 43 sec.)—*Colne*, China flotilla, with 13 hits in 18 rounds. Best shot, Able Seaman F. Drake.

6-pounder Q. F., with telescoping sights (scoring time, 30 sec.)—*Albatross*, 7th flotilla, with eight hits in 24 rounds. Best shot, Able Seaman W. Falukener.—*Naval and Military Record*, 5/16.

LONG RANGE FIRING.—Both by land and sea the present war has been largely one of long range firing. On sea the Allies have brought 15-inch guns into play, with an effective range of upwards of 24,000 yards, while on land the Germans have produced a weapon which will carry from an emplacement near Dixmude in Flanders to the port of Dunkirk in France, a distance which exceeds 23 miles. It may be interesting to lay readers to state that the best 12-inch guns of the British fleet, of 50 calibers, throw a projectile weighing 850 pounds a distance of 24,874 yards, after leaving the muzzle, with a velocity of 3010 yards per second. The 13.5-inch guns, of 45 calibers, have a m. v. of 2700 yards per second, and throw a 1250 pound shot 21,658 yards with an accurate aim. The 15-inch guns of the *Queen Elizabeth* and her sisters throw a projectile weighing 1950 pounds a distance of 21,193 yards, and they have a m. v. of 2500 yards per second.

Our latest 15-inch guns could easily carry from Dover to Calais, if they were placed on mountings where they could be fired with from 45 to 50 degrees of elevation. The turrets of our present battleships restrict the elevation at which their guns can be fired, and confine their use to a distance at which the trajectory of their projectiles is reasonably flat and suitable for sea purposes. The modern battleship, ponderous though she be, has her limitation in forming a target for an opponent, since every mile of distance tends to diminish her size on the horizon, until she can no longer be seen. For this reason the port holes of the turrets of a warship are only cut large enough to permit of elevating the gun sufficient to cover the distance of practical sea-firing, and keep the aperture as small as possible through which the enemy's fire may enter and kill the gun's crew.

As a rule, the highest points can be searched, but it is a fact that the present method of mounting ships' guns in turrets handicaps the gunners where extreme high-angle fire is needed, as it is at present needed in forcing our way to Constantinople. The question is one of keeping heavy seas out of the foremost turrets in bad weather, as well as the fire of the enemy in a hot action, and yet providing for such extreme elevation for the guns as will allow of their projectiles being thrown every yard they will travel. Given the necessary elevation, the 15-inch guns of *Big Eliza* would throw their projectiles about 46,000 instead of 21,000 yards. The difference, it will be noticed, is over 100 per cent.

Long range firing from ship's guns, therefore, depends as much upon the form of the port-hole of the turrets, batteries, and casements of a battleship, as upon the weapons they mount. Most of our ships engaged at the Dardanelles are what are known as pre-dreadnoughts, and most of the turret port-holes of these vessels are cut to give their guns a maximum elevation of 13½ degrees only, whereas at least 30 degrees would be required to allow the class of ordnance they carry to throw their shot to the last possible yard their cordite charges would send them. Other countries, such as Japan, in her *Asahi* and *Shikishama*, have exceeded our 13½ and given their turret guns 15 degrees of elevation, while the Italians have provided some of their naval 10-inch guns in turrets with as much as 35 degrees. The Germans, also, have provided some of their warships with facilities for extreme high-angle firing, although exact figures are not available.—*United Service Gazette*, 5/27.

ENGINEERING

RELATIVE ADVANTAGES OF TURBINES, DIESEL ENGINE AND RECIPROCATING STEAM ENGINE DRIVE.—Q. What are the relative advantages of the turbine and Diesel engines over the reciprocating engine for ship propulsion in regard to first cost, steam consumption, service, and useful life? A. T. S.

A. The question is too broad to be properly answered here, as it involves the consideration of so many factors as to make a comprehensive answer far too voluminous. Briefly, however, conservative engineering judgment, backed by experience in actual installations, seems to warrant the following generalizations. Direct connected turbines show excellent economy and are reliable for high-speed vessels and for these installations result in a saving of weight and space for propelling machinery. They are higher in first cost than a reciprocating steam engine installation.

For vessels of 15 knots or under, the principal turbine companies now recommend geared turbines, and even for high-speed vessels this is finding much favor. Confining attention to vessels of the cargo-carrying class at speeds below 15 knots, the margin between the several methods of propulsion is so small that local or economic conditions which may have no bearing upon engineering features often are the deciding factors.

A careful comparison of two vessels of identical external characteristics, but with a reciprocating steam engine and Diesel engines for the propelling machinery recently appeared and gives an excellent account of several items in coming to a reasonable decision.* A table is appended giving this comparison and the comparison is extended in the same manner to include approximate figures for geared turbines. Allowance has been made for the difference in tonnage measurement and deadweight carrying capacity which the systems involve. The vessel chosen for the comparison is 400 feet length between perpendiculars, 52 feet beam, 29 feet 9 inches depth, 26 feet 1 inch draft. Total deadweight carrying capacity in tons, 8640 (steam), 8775 (Diesel), 8805 (geared turbines). Speed, 10½ knots; radius of action, 3500 miles; fuel consumption, 1.6 pounds per indicated horse-power per hour; 1.6 pounds per indicated horse-power per hour (reciprocating); 1.2 pounds per indicated horse-power per hour (turbine); .61 pound per indicated horse-power per hour (Diesel).

In general, for moderate speed ships which would be driven by a single reciprocating engine, a Diesel engine ship is more costly, as the machinery is more expensive and the hull also, on account of the twin screws, oiltight work, etc., but the space occupied by propelling machinery is less and the weight is less, so that there is a gain in cargo-carrying capacity and weight. At the present state of development Diesel engines are not suitable for high-powered vessels from engineering rather than economic reasons.

* "The Relative Possibilities of the Diesel Oil Engine, Geared Turbine and Suction Gas Engine." North East Coast Institution of Engineers and Shipbuilders, 1912.

Geared turbines undoubtedly operate on increased steam economy, but there is little difference in the machinery weight and space and the first cost is higher than the standard machinery. A gain claimed for them is the absence of racing during heavy weather, which, however, is always less noticeable in any form of twin-screw drive. The item of first cost is so important that it oftentimes settles the question out of hand, as it persists in the shape of increased insurance, etc., throughout the life of the vessel, and may transform receipts from profit to loss.

There is but little to choose as to reliability between the various systems, and figures are not available as to length of useful life. It is probably questionable, however, if either Diesel engines or geared turbines will have as long a period of usefulness as the present standard steam engine of the reciprocating type.

	Oil Engine		Steam Engine		Geared Turbine	
Capital invested	$381,000		$308,000		$351,000	
	Per Voyage	Per Month	Per Voyage	Per Month	Per Voyage	Per Month
Insurance	.....	$2,390	.....	$1,800	.....	$2,050
Fuel (oil at $9.77, coal at $3.66)	$1,756	.....	$2,170	.....	$1,738	.....
Wages and provisions	.....	1,700	.....	2,000	.....	1,930
Wear and tear	.....	537	.....	488	.....	439
Deck and engine room stores	.....	537	.....	488	.....	488
Port charges, at $1.22 per ton	3,680	.....	3,590	.....	3,590	.....
	$5,436	$5,164	$5,760	$4,776	$5,328	$4,927
16 voyages	87,000	.....	92,200	.....	85,300	.....
12 months	62,000	.....	57,300	.....	59,200	.....
	$149,000	.....	$149,500	.....	$144,500	.....
5% depreciation	19,000	.....	15,400	.....	17,550	.....
Management	2,440	.....	2,440	.....	2,440	.....
	$170,440	.....	$167,340	.....	$164,490	.....
Freight-earning cargo carried, tons	16 × 8530	= 136,480	16 × 7880	= 126,080	16 × 7910	= 126,560
	170,440.00		167,340.00		164,490.00	
	136,480.00		126,080.00		126,560.00	
	$1.25 per ton		$1.33 per ton		$1.30 per ton	

It is interesting to note that if the price of oil for the Diesel engine rises above that indicated in the table, or the price of coal falls below the given price, the margin quoted is seriously affected and may be reversed.—*International Marine Engineering*, May, 1915.

NEW SEARCHLIGHT MIRROR.—The new searchlight mirror of the United States Navy Department, designed by J. A. Rey, in France, is described by Herbert T. Wade in the *Scientific American*. A mirror of glass at best is delicate and is likely to crack from shock or concussion, while a silver surface is, in addition, liable to corrosion. The new mirror makes use of an important improvement by substituting gold for silver as the reflecting surface. This film of gold is electroplated in a parabolic surface formed from a massive casting of bronze. Not only can such a mirror withstand the shock and concussion to a greater degree than one of glass, but even if the reflector itself is pierced by a bullet or small shell the apparatus may not be seriously damaged. The optical properties of the gold surface afford marked increase in visibility. In the case of a fog or haze the gold beam is able to pass through the atmosphere more effectively than the beam from

silver reflectors. The 44-inch searchlight, the largest yet to be tested for the navy, was tried last year on the battleship *Arkansas,* and as a result acquired by the Navy Department. In addition to possessing a gilt mirror there is an interesting mechanism for distant control, which adds greatly to effectiveness. The searchlight may be mounted at any desired point, and an observer at the bridge or other convenient point controls its movements. By electric connection motion is imparted to the searchlight corresponding to the motion of the telescope of the observer. The system of control is also the invention of J. A. Rey. Similar installations have been used in the leading European navies and armies.—*Army and Navy Journal,* 5/1.

FAILURE OF CONDENSER HEAD.—Several years ago a curious accident occurred to an auxiliary condenser on one of our battleships. The sketch below shows diagrammatically the condenser with tandem circulating and air pumps. Two such condensers were carried, one in a separate compartment forward of the boiler rooms, the other in the port engine room. Ordinarily only one was kept running to handle the auxiliary exhaust and discharge from traps and drains.

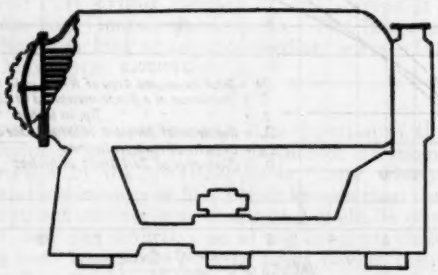


DIAGRAM SHOWING FAILURE OF CONDENSER HEAD

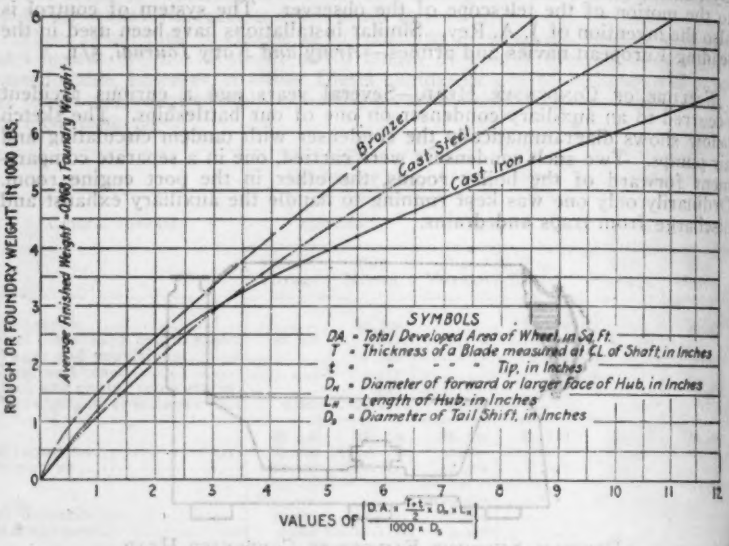
The forward condenser had been running all day and was shut down at 5 o'clock in the afternoon, the after one being started at the same time. The machinist's mate, who shut down the forward condenser carelessly failed to close the valve from the drain line. Of course hot water and steam from the drain line continued to empty into the condenser and must have caused it to heat up considerably.

At about half past seven o'clock that night it was desired to again start up the forward condenser. Accordingly, an oiler was sent to look after the job. He later stated on oath that he had opened the sea discharge before starting the circulating pump, and his statement was corroborated by men working in the adjoining boiler room. He did not, however, take the precaution to feel the condenser.

As soon as steam was turned on the pump it started with a bang. The cold water, coming in contact with the hot condenser tubes, formed steam and caused water hammer. Such a great pressure was created in the condenser that the pump had not made more than two strokes before the end of the bolt supporting the center of the condenser head flew off, and the condenser head itself was bulged out about six inches and cracked in the middle. The dotted lines on the figure show approximately the shape into which it was forced.

After the accident a careful examination of the damaged condenser showed no deterioration in the metal which might account for the failure. A board appointed to investigate the cause of the accident reached the conclusion that, although the sea discharge was open, the steam formed in the condenser when the pump was started caused water hammer and sufficiently high-pressure to break the bolt and distort the condenser head.—H., *International Marine Engineering,* June, 1915.

WEIGHTS OF SOLID FOUR-BLADE PROPELLERS.—The writer had occasion at one time to collect some data on the foundry and finished weights of various solid, four-blade, cast iron, bronze and cast steel propeller wheels. As complete dimensional data accompanied these weights, it seemed as though a law or formula might be developed which would give with sufficient accuracy the weight of a wheel for both cost-estimating and design purposes. After several different formulæ were tried, the following was


ROUGH OR FOUNDRY WEIGHT IN 1000 LBS.
Average Finished Weight = .0368 x Foundry Weight
Bronze
Cast Steel
Cast Iron
SYMBOLS
DA = Total Developed Area of Wheel, in Sq. Ft.
T = Thickness of a Blade measured at CL of Shaft, in Inches
t = " " " " Tip, in Inches
Dh = Diameter of forward or larger Face of Hub, in Inches
Lh = Length of Hub, in Inches
Ds = Diameter of Tail Shaft, in Inches
VALUES OF

CURVES SHOWING ROUGH OR FOUNDRY WEIGHTS OF SOLID FOUR-BLADE PROPELLER

finally adopted as giving the most accurate approximation, and still not being unwieldy.

The foundry or rough weights were plotted on:

$$\frac{DA \times \frac{T+t}{2} \times L_h \times D_h}{1000 \times D_s}$$

where DA = total developed area of wheel, in square feet.
T = thickness of a blade measured at center-line of shaft, in inches.
t = thickness of blade tip, in inches.
D_h = diameter of forward or larger face of hub, in inches.
L_h = length of hub, in inches.
D_s = diameter of bore for shaft at forward or larger face, in inches. Approximately equal to the diameter of the tail shaft, in inches.

The foundry weights, or the weight of the wheel when turned out from the foundry ready for machining and boring, were used, as the finished weights varied much more, depending on the amount of machining done, and on the size of the cap fitted, etc. It was found that as a general average the foundry weight was about 3 per cent greater than the finished weights when no caps were fitted. The foundry weights also varied somewhat, however, due to the difference in ramming in the foundry. Two 4000-pound

wheels (cast iron) cast from the same pattern, but rammed by different molders, were found to differ by 240 pounds. So it is very probable that a curve plotted on this formula will come within the limits of uniformity of actual weights.

The factors going to make up this formula are those found on practically every wheel design. Three curves are shown; one for cast iron wheels, one for bronze, and one for cast steel wheels. Although the writer had not the available data, no doubt the weights of built-up wheels and also three-blade wheels could be plotted on this same base. It is advised that any readers having sufficient data actually plot their own results, to allow for any variations in weights due to any local standards in design.—L. A. BAIER, N. A., *International Marine Engineering*, May, 1915.

LONG NON-STOP RUN OF MOTOR SHIP.—The motor ship *Selene*, of the Anglo-Saxon Petroleum Company, Ltd., fitted with Werkspoor Diesel engines, recently made a non-stop run of approximately 9000 miles from Panama to Tientsin in 44 days, averaging a speed of 200 miles per day. The vessel left Cardiff December 19, arriving at Port Arthur January 13. After loading, she left Port Arthur January 21, and arrived at Colon January 28, leaving Panama for Tientsin January 30. The latter part of the voyage was made without touching at any intermediate ports.—*International Marine Engineering*, May, 1915.

TYPE OF ENGINE FOR SUBMARINES.—The question of the type of internal-combustion engine to be used for the propulsion of submarine boats on the surface is reviewed by the *Moniteur de la Flotte*, which states that as the four-cycle Diesel engine was at first better known than the two-cycle engine, its application to submarines was easier and could be effected more rapidly than the latter, and met with success at the commencement. The two-cycle engine, having been frequently built by firms having insufficient experience, did not at first give the results which were expected of it, and this type of engine acquired discredit in several instances. It was too hastily put upon the market—notably, by German manufacturers. But one or two builders of two-cycle engines have obtained during the last few years most satisfactory results with this type, from the points of view of safe working, simplicity of design, and economical running. In regard to simplicity of design, the two-cycle engine offers marked advantages over the four-cycle type, and it may be surmised that for powers exceeding 500 horse-power it will supersede completely the four-cycle type. For the same number of revolutions, the same power, and the same work, the two-cycle engine can be built lighter than the four-cycle engine. It also takes up less space, runs more smoothly, and is much more easily reversed than the four-cycle engine.—*Shipping Illustrated*, 6/5.

A FEATHERING PROPELLER FOR AUXILIARIES.—The Thompson Automatic Feathering Propeller, designed primarily for auxiliary schooners and manufactured by the Noyes Machine Company at 257 Front Street, South Portland, Maine, is intended for heavy duty, made of the best manganese bronze obtainable, having no gears, springs or hollow shaft, and is bored, fitted and keyed to a shaft like the ordinary wheel. This propeller is entirely automatic in its action, the blades swinging into the ahead position when the motor is started ahead. The wheel is fitted directly on the shaft, boring the forward end of it straight if the taper of the shaft is not long enough. The keyway is in the large end of the hub and the key should not be longer than the keyway, care being taken that it is fastened so that it will not slip endways if keyway in shaft is too long. The blades when feathering take more space fore and aft than a solid wheel.

These propellers are now in successful operation on many auxiliary craft, among which is the catboat *Aeolus* at Bath, Maine, where for the past two years it has given entire satisfaction, and the blades have never refused to feather when the boat has been under sail, nor have they stuck in any

TWO BLADE RIGHT HAND.

THREE BLADE LEFT HAND.

THE THOMPSON AUTOMATIC FEATHERING PROPELLER

way on the reverse. The yacht *Genevieve* at Harborside, Maine, the Boston fishing schooner *Manomet*, the New York fishing schooner *Ruth Martin*, and the schooner *Lochimar* are also among those fitted with Thompson propellers. An interesting illustrated folder may be had from the manufacturers.—*Marine Journal*, 5/15.

AERONAUTICS

NAVY YARD REPORTED DESTROYED BY RAID OF ZEPPELINS

BERLIN, June 23.

The Overseas News Agency issues a despatch from Christiania saying that several Zeppelins raided South Shields, England, on the night between Tuesday and Wednesday (probably June 15-16) and dropped many bombs on the Armstrong works there, which destroyed the navy yards and arsenal. The damage is said to have been enormous. Seventeen persons were killed and 40 injured.

News of the raid reached Christiania by the steamer *Iotum*.

It is likely that this message refers to the raid over the northeastern coast of England on Tuesday night last week. The censors permitted only the most meager account of the raid, permitting, however, announcement that 16 persons were killed and 40 wounded.

LONDON RAID EXPECTED

LONDON, June 10.

Since the first raid over London a week ago yesterday Zeppelins have been making almost nightly visits to some part of the country. The war authorities have at last decided to allow no information of any kind to be published about these so-called "air raids."

The short official statements which have been cabled to *The Sun* stating that Zeppelins appeared on the east coast, dropped bombs and killed and injured a few people, doing little material damage, are all that the press is allowed to print. These raids are believed to be really reconnaissances with the object of charting the sky. At a height of 10,000 feet it is, of course, difficult for an airship to know exactly where it is or what place lies beneath it; observations are taken much as they are taken at sea.

London, of course, is taken to be the real objective of the big raid. When one considers the districts that have been reached by the Zeppelins, when news of their visits was allowed to be published, it is easy to see how they have gone astray—sometimes in one direction, sometimes in another.

These mistakes have hitherto been carefully pointed out to the Germans by the very full information published on every occasion in the English press. The exact locality where every bomb fell was carefully given, and it must have been easy for the German authorities to correct every error made during the reconnaissances.

An air raid on London on a really big scale is thought to be quite certain, but it will probably not be attempted until more accurate information is possessed by the steersmen of the Zeppelins. There is no doubt that the British authorities are working hard to strengthen their methods of protection against such a raid.

At present the Zeppelin, remaining for the most part at a height of some 10,000 or 11,000 feet, seems to be fairly immune from attack by aeroplane. The Zeppelin, putting her tail down, can soar aloft at a great speed, whereas the aeroplane must ascend in a corkscrew route and has no hope of overtaking the dirigible.

GERMAN AEROPLANE ARMORED

LONDON, June 23.

The correspondent of the *Daily Mail* at Calais telegraphs that a German aeroplane of the newest type has been brought down by anti-aircraft fire. It is very heavily armored and has sufficient lifting power to carry a gun which is almost as big as a cannon.—*N. Y. Sun*, 6/24.

RADIO

LONGITUDES BY RADIO.—Prof. Frank B. Littell, U. S. N., of the Naval Observatory at Washington, describes in the *Scientific American* of April 24 the use of wireless telegraphy in the determination of differences of longitudes. It is only necessary to make a signal at any wireless station and to have this signal received and the time noted at the points whose difference of longitude is to be determined. Where the highest accuracy is desired, it is necessary to make a correction for the time of transmission, but this is very small. The question whether this method could be utilized for transatlantic longitudes has been answered in the affirmative by the successful work of the American and French parties in the winter of 1913-1914 in determining the difference of longitude between Washington and Paris. Professor Littell and Mr. G. A. Hill describe these experiments at length in the supplement of our scientific contemporary. A proposal from Captain J. L. Jayne, U. S. N., then superintendent of the Naval Observatory, to determine the difference of longitude between the Naval Observatory at Washington and the Observatoire de Paris by the use of radio signals from the naval station at Radio, Va., and from the Eiffel Tower station in Paris, was favorably received by the French authorities, and preparations were begun in the spring of 1913. The longest distance over which the wireless method had previously been applied was between Paris and Bizerte, about 960 miles. The French Government sent over a preliminary expedition with four observers in March, 1913. The party succeeded in securing a sufficient number of radio clock comparisons to convince them that the radio method would be entirely practicable at a more favorable season of the year. The astronomical and mathematical methods used in the successful experiments carried out later are described in detail.—*Army and Navy Journal*, 5/1.

WIRELESS TELEPHONY.—It is known that the Italian Navy has adopted Signor Marconi's instrument, and that our own Admiralty has been conducting tests aboard English vessels. The advantages of a system of wireless telephony in our warships during the war may be inestimable, and in any development of operations among the fleets in the North Sea would probably give us an advantage over our enemies that might have the most far-reaching effect. That the Admiralty have been experimenting during the war is a sure indication that their lordships realize the value and possibilities of wireless telephony. That the instrument should not prove satisfactory hardly seems conceivable, for although we cannot say what has been achieved in this country, it is known that with the only instrument that has arrived in the states communication has been established between New York and Philadelphia. If the Admiralty tests realize expectations we may rely upon the new First Sea Lord to press forward with all his power the installation of wireless telephony instruments in the fleet with the utmost expedition. Sir John Jellicoe calling up his fleet commanders is a possibility to reckon with, especially with the accompaniment of the enemy's probable inability to tap messages.—*Naval and Military Record*, 6/9.

WIRELESS TELEPHONY.—What a revolution will be achieved by the introduction of wireless telephony will be realized by those conversant with the far-reaching advantages which wireless telegraphy has given the world, especially that part of it which either in the pursuit of business or pleasure passes to and fro on the great waters. Scientists in many countries have been experimenting for several years to design an apparatus which shall bring the ends of the earth into conversation, but it appears to have been left for Signor Marconi to produce a practical wireless telephone. It is not yet known definitely how great will be the distance spanned by the instrument, but the inventor has expressed confidence in his ability to transmit audible speech across the Atlantic by multiplying the power and modifying the design of his apparatus. Possibly this feat will be accom-

plished when foreign conditions are again adjusted to normal. Nevertheless, as the *Scientific American* tersely points out, the short-distance wireless telephone will not wait for the end of the war. It is expected to become available for commercial use within a few months, and will have a guaranteed range of at least 30 miles between ships at sea carrying aerials 100 feet high and with 200 feet span between masts. The wireless instrument, it is claimed, reproduces speech more clearly and strongly than the wire telephone.—*Naval and Military Record, 6/9.*

MISCELLANEOUS

NEW DEVICE TO GUIDE SUBMARINE PILOTS.—Hudson Maxim has invented a new position indicator for submarines which he believes to be at once cheaper and much better than those now in use. This implement will enable a submarine to find her own position under water and will do away with the dangerous necessity of going to the surface for that purpose. Mr. Maxim has applied for a patent on this. He said yesterday that while it had not yet been granted, he understood it would be obtained without difficulty, and that the device would enable the captain of a submarine to find his position on a map at any time, within a hundred feet or so.

"There are position indicators of an English design in use in all the navies of the world," said Mr. Maxim. "Their work, however, is cruder; there was an instance at the beginning of the war where a German submarine, caught in a bay by a British flotilla, was unable to find the way out of the harbor without rising to the surface. As soon as she appeared above the water she was attacked and destroyed. My device would enable a submarine commander so caught to locate the mouth of the bay with accuracy and slip out under his enemies. The device, also, costs only $1000 to install in a submarine, whereas the position indicator at present in use costs $17,000. It could, of course, be used on any ship as well as on a submarine.

"As to a device to enable a submarine to locate another vessel without coming to the surface, there is no one, so far as I know, who has come anywhere near solving this problem. Every offensive device in the history of warfare has in the end been answered by a defensive instrument, and I have no doubt that in time some one will invent a reply to the submarine. But there is no sign of it yet."—*N. Y. Times, 6/21.*

SHOOTING SPECTACLES.*—The eyesight of soldiers and sailors is often injured, temporarily or permanently, by direct or reflected sunlight. The injury is caused chiefly by the invisible ultra-violet rays, which are absorbed by the tissues of the eye.

In the outer parts of the eye these rays cause disagreeable sensations, which are commonly included in the term fatigue. The eyelids become heavy and red, tears flow, and there is a sensation of pressure, itching and burning. Long continued or repeated exposures to the sun's rays may produce catarrh of the conjunctiva. In extreme cases, occurring in mountain climbing, polar exploration and balloon flights, the acute inflammation known as snow blindness is observed. This ocular inflammation is closely connected with the "glacier-burn," which is also produced by the ultra-violet rays. On several occasions the movement of armies over snow-clad mountain passes has been impeded chiefly by these effects of sunlight.

When ultra-violet rays penetrate more deeply into the eye, they evoke fluorescence in the lens and the retina. The glow-worm light thus produced in the eye itself spreads a haze or fog over external objects in the field of view. The small proportion of ultra-violet rays that reaches the retina diminishes the ability to see in dim light.

*Adapted from Dr. Schanz's article in *Die Umschau.*

Hence the exclusion of these injurious rays from the eye is very desirable, especially for riflemen and gunners. The newly invented greenish-yellow "euphos" glass absorbs the ultra-violet rays, together with part of the blue and violet rays, which contribute to the injurious effects above described, but freely transmits the rays that are useful for vision. The partial exclusion of the blue and violet rays presents another advantage in twilight, as it makes the blue evening clouds darker and gives prominence to objects of red and yellow tints.

I have often used these euphos glass spectacles in target practice on sunny days, to the great improvement of my marksmanship. I have also repeatedly employed them at sea, as a protection from the glare of the sun on the water. In particular, I have observed vessels immersed in this glare at the horizon and have made out many details which I could not distinguish with the unprotected eye. I have observed in this way for hours without experiencing any unpleasant sensations. Dr. Gross, who has had similar experience, says that the euphos spectacles diminish the width of the dazzling bright strips of water, sharpen the outlines of vessels and other objects at the horizon in the illuminated area, and are very useful in observing and aiming in the presence of searchlights.

Major Meyer, viewing the receding coast from the stern of an outgoing vessel, with the sun directly astern, observed with the naked eye a dazzling gap in the coast line, which closed up when the euphos glasses were used. Dr. Flemming wore light euphos glasses in a balloon flight attaining an altitude of more than 26,000 feet and experienced no inconvenience, while his companion, who wore dark gray glasses, suffered severely. Amundsen took with his on his Antarctic expedition a large assortment of protective glasses, including two pairs of light euphos glasses. Amundsen and Hansen, who wore the euphos glasses, were the only members of the party that escaped snow blindness.

The theoretical expectations formed by the euphos glass have, therefore, been realized in practice. There is no better protection against snow blindness than spectacles of euphos glass, and their employment also produces a notable improvement in marksmanship.—*Scientific American*, 6/26.

SUBMARINE BOATS.—A contribution by the famous French naval constructor, Mr. E. Bertin, to the proceedings of the Academic des Sciences, held in Paris March 29, appears in the French paper *Le Genie Civil*. In this communication Mr. Bertin reviews the two elements by which the distribution of the weights making up the displacement of submarines is distinguished from what obtain in other ships.

In the first place, the advantages to be derived from an increase in the dimensions of a submarine boat are influenced by the very heavy handicap which arises from the weight of the electric machine required for propulsion when submerged, and by that of the electric accumulators, equal to about 30 kg. (66 lb.) per horse-power hour, or between fifty and a hundred and fifty times the weight of fuel, considered as source of power. Were this consideration alone to come into play, the other elements making up the weight being taken as subjected to the same laws as those which rule in the case of ordinary ships, the qualities of speed and fuel endurance on the surface for submarines would fall within very narrow limits. Calculation shows that a maximum would be reached with a surface displacement of about 1000 tons. The fuel endurance at a speed of 17 knots would not exceed 1400 nautical miles. No alternative for the electric accumulators has hitherto succeeded; the working under water of an internal-combustion engine necessitates compressors and tanks equal to the weight saved; while propulsion by a hydrogen-engine, exhausting into the sea, would require an electrolysis apparatus which would not be less heavy.

A second element, more difficult of determination, would, on the other hand, work in favor of an increase in dimensions. It has its source in the law of increase of the fraction of displacement attributable to the framing,

this fraction increasing less rapidly than is the case with ordinary ships. As is well known, the resistance of ships' hulls to longitudinal flexure demands a fraction of the displacement, which increases as the cube root of the displacement. The resistance to hydrostatic pressure of the hull of a submarine is not subject to this law, and it has only to be considered sufficiently to ensure a more than adequate resistance to longitudinal flexure on the surface. An empirical calculation based upon the comparison of two submarines having both hulls of satisfactory strength, with widely different displacements, shows an increase in the fraction of weight of hull in the proportion of the sixth root of the displacement to be sufficient, in place of the cube root. The adoption of this hypothetical law increases the fuel endurance from 1400 miles to 2600 miles at 17 knots for the submarines of the future, having a displacement of 1000 tons on the surface. Beyound the displacement of 1000 tons, the fuel endurance would continue to increase, and would not have reached a maximum at a displacement of 2000 tons. If the gain due to larger dimensions be applied to an increase in speed, the fuel endurance remaining constant at 1050 miles, the maximum speed, taking the first law, would be 17.73 knots only, and would be reached with about 1000 tons. For the same displacement, and taking the second law, the speed would reach 19.7 knots on the surface.

In earlier calculations for a submarine to have a fuel endurance of 2000 miles when navigating on the surface, the fraction of the weight attributable to the hull has been taken as constant (as is done with ordinary torpedo-boats), no law of comparison applicable to the case of resistance to hydrostatic pressure being available.

The theoretical determination of the resistance of submarine hulls to compression has been gone into by several French naval architects. Mr. Marbec has dealt with it in a report on the flexion of elastic rings submitted to compression, and Mr. Simonot has carried out numerical calculations on the subject. Mr. Doyere has also contributed an essay, which he has not, so far, carried to a conclusion. No very definite conclusions having been arrived at in regard to the relations between the moments of flexion in the case of similar submarines, Mr. Bertin obtained from Mr. Marbec, in May, 1914, a note on the similitude of submarines which shows more precisely than a simple empirical comparison the law of increase of the fraction of weight attributable to the hull as the displacement increases. Here it may be recalled that the hydrostatic pressure varies from one point of the hull to another, the transverse dimensions of submarines being in no way negligible quantities in regard to the depth of immersion.

According to Mr. Marbec's formulæ, the fraction of weight attributable to the hull of submarine increases at the sixth root of the displacement, thus confirming the empirical calculation; but this law applies only to a degree of immersion such that the upper plating of the submarine is level with the water surface. Should the depth of immersion for which the resistance of the hull is calculated become such that the hydrostatic pressure on the hull might be considered uniform, the fraction of weight attributable to the hull relatively to the framing would be constant. In this latter case, the advantage of the increase in displacement would gradually lessen, but would never become nil. The absolute limit beyond which there was a loss would only be found with large displacements, where the exigencies of surface navigation would come into play.

In the intermediate conditions, which are those of actual practice, between immersion at the water surface level and immersion at infinite depth, the expression for the fraction of weight attributable to the hull includes two terms, one proportional to the sixth root of the displacement, and the other constant.

As showing the difficulty of establishing wholly satisfactory laws of comparison, Mr. Bertin observes that there can be no similitude between the stresses developed at corresponding points of two submarines of different dimensions. Equality of stress may be obtained at two homologous points,

but will not exist at other points. The results of compression tests made occasionally on models are therefore liable to error, except in the case of very high pressures corresponding to an immersion at a very great depth. Equality in the stress at two homologous points exists, moreover, only for a determined depth, and disappears at other depths.—*Shipping Illustrated*, 6/12.

PRINCIPAL SUBMARINE DISASTERS IN LAST TEN YEARS

Date	Boat	Lives Lost	Nature	Circumstances
Mar. 18, '04	*A 1* British	11	Collision	Running submerged—run into by *Berwick Castle*—apparently faulty periscope.
June 20, '04	*Delfin* Russian	26	Foundered	Ballast tanks filled while hatch left open. Wash of passing steamer caused swell and wave entered hatch.
June 8, '05	*A 8* British	14	Foundered	Running full speed on the surface—took a sudden dive, filled and sank.
July 6, '05	*Farfadet* French	14	Foundered	When submerging, conning-tower tubes leaking, crew tried to close and accidentally opened—boat filled and sank (crew responded to signals for 32 hours).
Oct. 16, '06	*Lutin* French	13	Foundered	Failed to come up after a dive—examination of hull showed serious leaks.
Apr. 26, '09	*Foca* Italian	13	Explosion	Gasoline explosion—boat so badly damaged that she sank.
June 12, '09	*Kambala* Russian	29	Collision	On surface—run into B. S. at maneuvers.
July 14, '09	*C 11* British	13	Collision	Running on the surface at night—in collision with Str. *Eddystone*—sank.
Apr. 16, '10	*No. 6* Japanese	All	Foundered	Ventilator left open submerging.
May 26, '10	*Pluviose* French	26	Collision	Coming to surface from submerged run—run into by Str. *Pas de Calais*—sank.
Jan. 17, '11	*U 3* German	3	Foundered	Ventilator not properly closed when submerging—vessel only partly filled, bow lifted and all but 3 got out.
Feb. 2, '12	*A 3* British	14	Collision	Making attack on tender which was under way—totally submerged—tender ran into her.
June 8, '12	*Vendimiare* French	24	Collision	Making submerged attack on B. S.—periscope under—coming to surface—run down by *St. Louis*.
Oct. 4, '12	*B 2* British	15	Collision	Running in squadron on surface at night—run down by *Amerika*.
June 8, '13	*E 5* British	3	Explosion	Gas (heavy oil) engine explosion in crank case; boat not sunk or badly damaged.
Dec. 10, '13	*C 14* British	None	Collision	Running on surface in squadron, run into by lighter and sunk.
Jan. 16, '14	*A 7* British	11	Foundered	Making submerged run off Plymouth failed to come to surface.

—*The Navy*, May, 1915.

NO TENTS IN GERMAN ARMIES.—It may or may not have been noticed by our readers that in the photographs of the theater of war, at least on the German side, no tents appear. That is one of the innovations which modern

warfare has brought in the German Army. Tentage used to form a not inconsiderable part of the impedimenta of armies, and this elimination lightens not a little the task of the quartermaster's department. The German plans contemplate always an offensive, presumably to be carried out in the enemy's country, and involve the billeting of the troops in the homes of the inhabitants of the conquered country.—*Scientific American*, 6/26.

THE HUMANE SIDE OF WAR.—Although for generations past this country has been repeatedly engaged in "little wars," it is generally recognized that we have much to learn as to the effects of modern gun-fire in naval actions. For this reason the publication of *The Journal of the Royal Naval Medical Service* is timely and welcome, as its pages are devoted almost entirely to articles dealing with the different phases of the humane side of the present war. The *Journal* is edited by Fleet Surgeons R. C. Munday and W. L. Martin, both distinguished members of their profession. The second number, which has just been issued, contains several contributions which will claim the attention not only of medical men, but of the public generally. One is by Staff Surgeon A. J. Hewitt, who describes in almost matter-of-fact but intensely interesting language his experiences in the action between the British light cruiser *Pegasus* and the German cruiser *Königsberg*, in which the former vessel was caught at such a terrible disadvantage that she was practically helpless. Describing the effects of the *Königsberg's* fire, the author remarks that the danger zone, as far as life was concerned, seemed confined to a small area round the bursting space, and although the initial velocity of the fragments appeared to be very great, this seemed to rapidly diminish, perhaps owing to the irregularity of their shape. As the result of his experience, Staff Surgeon Hewitt makes a suggestion which will doubtless receive due attention in the proper quarter. Small fragments, he writes, were "the cause of loss of four eyes, and I am of opinion that a pair of motor goggles would have saved all these." He also expresses the opinion that a coat of light chain armor or even leather, with a pair of goggles made from toughened motor screen glass, would be invaluable to captains of destroyers, navigators, and others in exposed positions who are likely to encounter ships armed with similar guns. In the same number of the *Journal* Staff Surgeon J. R. Muir, of H. M. S. *Tiger*, deals with "The North Sea Action of January 24th," and Surgeon K. H. Hole gives "Some Experiences in a Hospital Carrier," both admirable contributions.—*Naval and Military Record*, 5/5.

SUBMARINE SIGNALLING.—Of all the perils which attach to ocean navigation the most paralyzing are undoubtedly those caused by fog. No type of ship is immune from its terrors, and the larger and faster the vessel the greater the menace. Every ship captain is well aware that impending death and disaster lurk for him in fog, though his vessel be one which under ordinary, or even extraordinary conditions of wind and wave, is practically superior to all dangers. He is quite able to avoid rocks and shoals by the provisions which science has made available to him, and no storm at sea is able to shake his confidence in the staunchness of his ship; but fog takes away his eyes and filches from him the sure dependence on his ears which he has in a clear atmosphere. He can no longer be sure of either the direction or distance of origin of sounds he may pick up, and so must needs bow to a *force majeure* which he cannot control. When it is realized that these conditions are practically the normal conditions of service of underwater vessels, some idea may be formed of the difficulties of submarine navigation, for submarines are almost at as great a disadvantage as a surface ship in a fog. They dare scarcely show even a periscope when in the proximity of an enemy vessel, unless it be absolutely necessary to take that risk in order to deliver an attack. It is little wonder, then, that the question of submarine signalling is attracting much attention, for it promises to provide both mouth and ears to these vessels, in the sense that by its means a submarine and its mother vessel may be put into

more or less perfect communication. Each may be able to originate and to receive signals by means of sound waves propagated in water instead of in air.

It is true that large submarines are provided with wireless telegraphy apparatus, which is of much use on the surface but of little or none when submerged. The speed of sound transmission in water is more than four times that in air, but the greatest advantage is that the direction of origin can be obtained with considerable accuracy, whereas the action of air upon these waves of sound, more especially air filled with fog, is mysteriously disconcerting. As long as thirty years ago, Professor Tyndall, on behalf of Trinity House, and Professor Henry, authorized by the United States Government, agreed, as the result of separate researches, that fog signals in air were quite untrustworthy, and to this day the authorities warn mariners against placing implicit trust upon air signals which depend on hearing alone, without the corroborating evidence of vision.

There is novelty in the idea of producing sound waves in water. It is stated that Cingalese fishermen have handed down from remote times a method of submarine signalling by means of striking an earthen bowl submerged outside their fishing boats, their code signals being picked up on other boats by the simple expedient of placing the ear against the hull of the boat. Most people are familiar with the classic experiments made in 1826 by the two scientists Colladon and Sturm on Lake Geneva, in which these pioneers determined that the velocity of sound in water was 4708 feet per second, and that they could pick up signals at a distance of 32 kiloms. Practical application of the discovery was long in coming, and it is only in recent years that its potentialities have been appreciated. More than fifty years elapsed before the first patent was taken out in this connection. Since then intermittent investigations have been made by Edmunds, Mundy, Gray, Edison and many others, and these have gone to build up the certainty that submarine signalling is not only a practical possibility, but also a most valuable aid to navigation. It was exploited at first mainly for the purpose of sending out warning signals from shore stations when lights were invisible and air-borne sounds unreliable, but that is obviously a restricted application of its usefulness, for it is confined to emission of signals from fixed points and reception of these signals by passing vessels in the immediate neighborhood.

The possibility of fitting ships with an installation comprising both transmitter and receiver opened a much wider field of operation, but coincidently a greater number of difficulties. It made possible the great advantage of underwater intercommunication between passing ships at any point in their voyages and under conditions of danger from fog. Development of even such a useful possession for commercial vessels is slow, but in war times its military value in widening the possibilities of service of submarines is a different matter. It is obvious that such a development would need no adventitious aids. The limitations of the submarine have been too clearly shown wherever their quarry has been a fast-moving warship to make it at all doubtful that something more is needed than the periscopes to aid the submerged vessel in locating her prey. It is no secret that many submarines are fitted with both submarine bells and receiving microphones which act well within a limited area, and with these communication, of a kind, can be kept up with a mother ship at short range. More powerful ears are, however, required to detect at long range sounds which are propagated by a mother ship or by propellers or engines of an enemy so that her position and distance may be determined in darkness and without the necessity of coming to the surface in daylight. The original method of propagating sound waves was the submarine bell, while the receiver was a kind of large trumpet fitted with a rubber diaphragm. Developments of this method have resulted in the adoption of a peculiar form of thick-rimmed bell to propagate waves of sound in association with an ordinary microphone as receiver. By immersing the microphone in a

tank of water attached to the bow of the vessel below the water-line quite successful results have been obtained. More than a hundred bells are in operation at transmitting shore stations and more than a thousand vessels are fitted with microphone receivers. The peculiar sounds emitted by these bells do not lend themselves to Morse signalling, nor is their range very great under sea conditions, where many other ship noises combine to muffle and confuse them. It was therefore a great advance when it was found that longitudinal vibrations of a wire or a ribbon of metal produced much more powerful waves of energy in water. Most of us can remember the boyish delight we found in producing such vibrations by means of a piece of string coated with resin attached to a small tin, so that friction between the thumb and forefinger set up longitudinal vibrations which were more powerful than pleasant. Berger's apparatus, first tried in the Danube in 1910 with a piano wire 2 mm. in diameter, transmitted messages 28 kiloms. Further experiments with a wire of double the thickness increased the range to four miles. In each of these cases the wire was excited by friction of a hand-driven wheel, and it was found that a clear-toned note was produced, capable of being propagated in the dots and dashes of the Morse code. The principle being established, it was a simple matter to substitute mechanically controlled and power-driven exciters, acting upon larger metal ribbons. Such an installation with three ribbons, 1½ inches wide and 1/16 inch in thickness, excited by a 3 horse-power motor, has been under test in the U. S. S. *Arkansas*. Messages have been received at 10 knots range, but better results are expected when various adjustments have been made, and obviously the system is capable of great extension. More recently still a further development has been made by using an electrical oscillator designed by Professor R. A. Fessenden, which, by means of alternating currents acting on a powerful electro-magnet, causes a light copper tube to oscillate a thousand times per second, and to impart from a suitable diaphragm waves having a length of 9 feet and a clear note five hundred times per second. This apparatus was also tested in the U. S. S. *Arkansas*, and had a range of 10 knots, but when the transmitter was hung outside the ship in open water the messages were clearly readable at a distance of 30 miles. This instrument has the further advantage that it may be operated either as a generator or a motor, so that it becomes either a transmitter or a receiver at will. By using a Morse key the speed of signalling is equal to that of ordinary aerial wireless telegraphy, and it has therefore been sometimes called "submarine wireless." The art of submarine signalling is a rapidly developing one, and while it must still be looked upon as immature, there can be no doubt that under pressure of war necessities it will receive earnest attention, and in all probability be improved and adapted not only for use on war vessels, but eventually for the purpose of increasing the safety of ordinary ocean travel in peace times. Two papers on this subject have been read recently before the Society of Naval Architects and Marine Engineers in New York, one of which, by Commander F. L. Sawyer, U. S. N., is devoted to the possibilities of submarine signalling as a method of obtaining safe navigation in fog. Simple and inexpensive apparatus has been designed by which ships may locate one another within a radius of five miles, and communicate their respective bearings, speeds, and distances apart, so avoiding much of the danger of collision; but there are difficulties still to be overcome.

The submarine bell as a propagator of sound waves has the advantage that when struck its pulsations are emitted in all directions, but, as already said, it is not suited for Morse signalling. Diaphragm systems are powerful and suited for shipwork, but are naturally directive in their transmission. Similarly, all receivers are at present directive; they should also be "all round" in their action to give satisfactory results, and even when this is accomplished some means will have to be devised to eliminate the sound shadows caused by portions of the hull and by propeller noises in the wake which interfere with the intensity of the propagated waves. These

difficulties will all be overcome in time, and the system developed to full usefulness. In the meantime, most valuable work is being done with the bell and microphone in the limited sphere to which they are applicable. The powerful bells in use at shore stations are unsuitable for use on ships, which at present are only fitted with receivers and so cannot communicate with one another—with the exception of some submarines which have both bell and receiver—but when it becomes general to fit large ships with transmitters the dangers from collision and stranding will be much reduced.

Experiments with a sound wave oscillator have shown clearly that the presence of an iceberg may be detected at a considerable distance. Echoes have been picked up at a distance of more than two miles by this means when no echo could be obtained with a steam whistle at a distance of 150 yards. There is the further advantage that the time of travel of a sound wave in water is only one-fourth of that in air, and every second counts on a fast ship in the neighborhood of ice.

It remains to be seen whether the system will realize all it promises, and there is every reason to suppose that its military possibilities alone will attract sufficient attention to demand immediate investigation on a larger scale.—*The Engineer*, 5/7.

GYROSTATS AND GYROSTATIC CONTROL.—*Experiments Leading Up to New Gyrostatic Controls for Torpedoes, Submarines, Airships, and Aeroplanes.* By Mr. James G. Gray, D. Sc., F. R. S. E. (Institution of Engineers and

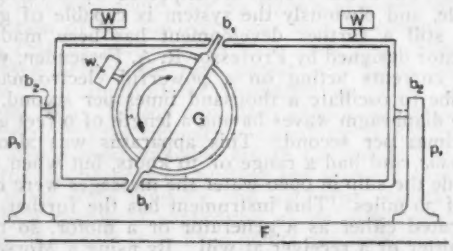


FIG. 1.—GYROSTATIC CONTROL FOR TORPEDO OR AIRSHIP.

Shipbuilders in Scotland; November, 1914).—The object of the author was to describe in this paper a number of gyrostatic devices available for controlling moving bodies, with particular reference to the production of gyrostatic controls for torpedoes, submarine craft, airships and aeroplanes. In all the cases considered the stability of the gyrostatic system is derived directly or indirectly from the propelling system.

Fig. 1 shows diagrammatically a gyrostatic device adapted for steering a body stable in itself, such as a torpedo. The gyrostat is mounted on bearings b_1b_1 carried by a frame f; it is made azimuthally unstable by sloping the line of these bearings to the vertical, and attaching a weight W to the frame of the gyrostat. The frame is carried on horizontal bearings b_2b_2 arranged on pillars p_1p_1 attached to the moving body. The frame f is rendered laterally unstable on these latter bearings by attaching to it the weights WW as shown. The gyrostat clearly possesses two instabilities without rotation of its fly-wheel. When the gyrostat is suitably connected up to the steering mechanism these two instabilities give rise to complete stability of the gyrostat when the body is in motion. The frame f may conveniently carry apparatus for applying tilting couples to the gyrostat.

In the construction of wheeled vehicles it has been found sufficient to connect up the gyrostat directly to the steering wheel or wheels; but in the case where a steering mechanism, such as a rudder or plane, has to be

operated forcibly it may be advisable to multiply up the couple transmitted by the gyrostat. A highly satisfactory method is shown in Fig. 2. One end of a cord is attached to a point on the frame of the gyrostat. The cord is then passed once or more times round a vertical drum or pulley d_1, then round a drum D carried by the rudder post, then round a drum or pulley d_2, and finally fastened to the gyrostat frame as shown. The two pulleys $d_1 d_2$, which are of equal diameter, are geared up to a small electric motor, and revolve in opposite directions with the same speed. If the gyrostat precesses, one of the cords attached to it becomes taut. A small stretching force in the cord on the gyrostat side of d_1 gives rise to a large stretching force in the cord on the drum side of d_1. If the stretching force on the gyrostat side of d_1 is zero, that on the drum side is also zero. It will thus be seen that a small couple applied by the gyrostat results in the application of a very large couple to the drum, and hence to the rudder.

The rudder is shown connected up, so that when the gyrostat precesses the body is steered up parallel to it—that is, so as to maintain the axis of the fly-wheel transverse to the body. A ship or torpedo steered by this mechanism will pursue a perfectly straight path.

In the form of torpedo at present in use the gyrostat is freely mounted on gimbal rings, and although the latter gives very good results over

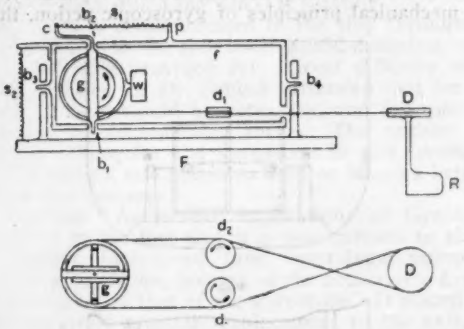


FIG. 2.—CONTROL FOR SHIP OR TORPEDO, WITH STABILIZED GYROSTATIC CONTROL

short distances it would be useless in a long-distance projectile, even if a motor gyrostat were substituted for the one now employed. In a dirigible torpedo, properly so called, the gyrostatic mechanism should be such that the gyrostat is endowed with complete stability. This condition fulfilled, the gyrostat can be caused to bring about turning movements of the torpedo by the application to it of tilting couples.

The construction of a very high-speed long-distance torpedo, to run completely submerged, and propelled by power stored within the projectile, is difficult, if not impossible, at the present time; but a long-distance torpedo, driven by electric power derived from accumulators, and having a speed of from 15 to 20 knots, could certainly be evolved. Such a weapon, with a range of action of, say, 100 miles, and possessing the property that it could be set to travel on a pre-arranged path, would be a valuable addition to British naval appliances. The torpedo, for example, could be arranged to proceed in a straight path from one position A to the neighborhood of a second position B, and left cruising in that neighborhood.

The progress which has been made in the development of the internal-combustion engine renders possible the construction of a torpedo capable of running at high speeds for very lengthened periods without attention

or renewal of fuel. Such a torpedo would, however, not be entirely submerged, inasmuch as an air inlet and an outlet for the products of combustion must be provided. To steer such a torpedo from a fixed or moving station, it would be necessary to connect the torpedo to the station by means of a pair of fine wires, which would be paid in or out as desired. This torpedo, brought to perfection, would be a formidable weapon with which to fight submarines. The directing of torpedoes by the wireless transmission of electrical action is not practical at the present time. To be effective the sending apparatus at the receiving station would require to be tuned to the receiving apparatus on the torpedo beyond the possibility of interference from without.

In conclusion it should be recognized that ship, torpedo, aeroplane, and airship controls can only be brought to perfection on a large scale as a result of experiment and trial. There can be no doubt that the present-day applications of gyrostatics to warfare are mere shadows of what is to come in the near future, and it is a matter of supreme importance that Great Britain should lead the way in the scientific advancement of the subject.

GYROSCOPIC APPLICATIONS, WITH DEMONSTRATIONS. By Mr. T. R. Thomas, B. Sc. (Liverpool Engineering Society; January, 1915).—After describing the mechanical principles of gyroscopic action, the author deals

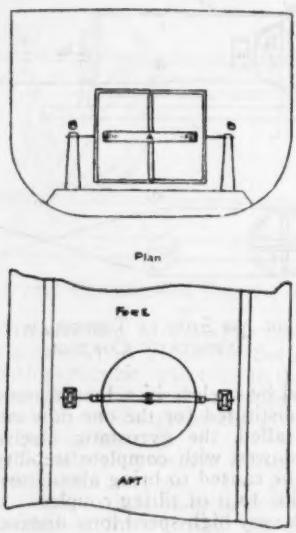


FIG. 1.

with the gyroscope as applied to the prevention of the rolling of ships. The earliest application in this direction seems to have been made with the cross-channel steamer *Bessemer*, the large saloon of which was swung on trunnions fore and aft. The bow and stern of this vessel were alike, and two sets of oscillating engines were fitted, one set forward and one aft. In order to prevent the saloon from rolling, two large hydraulic rams were fitted, capable of exerting a pressure of 1500 pounds per square inch on the sides of the saloon, a man being employed to regulate the action of the rams and having a pendulum to guide him. It was found, however, that it was impossible to foresee how far the ship would roll, and at times when she

appeared to be going to port she rolled to starboard, the list of the saloon being increased. To overcome this difficulty a gyroscope was fitted to control the rams, but it failed, apparently because it was not allowed to precess. Great difficulty was encountered with the pressures required to move the saloon. When the ship was progressing at the rate of 23 knots, an enormous force was required to move the saloon out of the vertical. At this speed, with 1500 pounds per square inch on the 6-inch ram, the saloon would not move, although when the vessel was quite still the saloon was finely balanced.

No further practical step seems to have been made until Dr. Schlick introduced his apparatus for the prevention of rolling. Fig. 1 shows the arrangement as fitted. The wheel *A* is mounted in a frame, which can swing in a fore and aft direction about the trunnions *BB*. As the ship rolls, inclining the axis of the wheel, the wheel tilts in a fore and aft direction, and the resulting effort is to right the ship. When applied to a small vessel this apparatus was successful in considerably reducing the roll, but such success depends largely on the period of the natural roll of the ship. In this connection it should be stated that gyroscopic action depends on:

(*a*) The moment of inertia of the rotating wheel about its axis.
(*b*) Its freedom to incline its axis of rotation in one or more directions.
(*c*) The velocity with which the axis of the wheel is inclined.
(*d*) The velocity with which the wheel is rotating.

The righting force is communicated to the ship through the trunnions, and the resulting strains in the ship itself would doubtless make themselves apparent unless specially provided for. Great difficulty was experienced in the matter of weight, for Dr. Schlick estimated that for a ship of 6000 tons a wheel of 20 tons would be necessary, and the total weight of the installation would be considerably more. The author considers that there is but little future for the gyroscope in this direction, but it has been applied to keeping a gun platform level on board a battleship and may be developed for this purpose.

Under the heading "Accidental Applications of Gyroscopic Actions," the author referred to the fact that it is now general to place the axes of electric-light engines, high-speed fans, centrifugal pumps, etc., aboard ship in a fore and aft position, because of the action of a dynamo shaft and armature corresponding to that of the gyroscope. If placed across the ship each roll gives a certain angular displacement to the axis, resulting in a stress on the shaft which will ultimately result in the breaking of the latter. The same conditions appear in a ship fitted with turbines, or in a reciprocating-engined vessel having a large fly-wheel, but in this case the stress in the shaft is due to pitching and not to roll, as rolling cannot give the axis of the wheel—in this case the shaft—any angular movement.—*Shipbuilder.*

POISONED GASES.—The following is a copy of a report dated May 3 by Field Marshal Sir John French on the employment by the Germans of poisonous gases as weapons of warfare:

The gases employed have been ejected from pipes laid into the trenches, and also produced by the explosion of shells especially manufactured for the purpose. The German troops who attacked under cover of these gases were provided with specially designed respirators, which were issued in sealed pattern covers. This all points to long and methodical preparation on a large scale.

A week before the Germans first used this method they announced in their official *communiqué* that we were making use of asphyxiating gases. At the time, there appeared to be no reason for this astounding falsehood, but now, of course, it is obvious that it was part of the scheme. It is a further proof of the deliberate nature of the introduction by the Germans of a new and illegal weapon, and shows that they recognized its illegality and were anxious to forestall neutral, and possibly domestic, criticism.

Since the enemy first made use of this method of covering his advance with a cloud of poisoned air, he has repeated it both in offence and defence whenever the wind has been favorable.

The effect of this poison is not merely disabling, or even painlessly fatal, as suggested in the German press. Those of its victims who do not succumb on the field, and who can be brought into hospital, suffer acutely, and in a large proportion of cases die a painful and lingering death. Those who survive are in little better case, as the injury to their lungs appears to be of a permanent character and reduces them to a condition which points to their being invalids for life. These effects must be well known to the German scientists who devised this new weapon and to the military authorities who have sanctioned its use.

I am of the opinion that the enemy has definitely decided to use these gases as a normal procedure, and that protests will be useless.—*Army and Navy Gazette*, 5/8.

With reference to the asphyxiating gas used by the Germans against our troops and those of our Allies, opinions have been expressed by many competent and other people as to its constitution. Thus the military correspondent of a popular halfpenny London daily paper described it as "chloride of sulphur." The special correspondent in Northern France of another London journal suggested it might be "a carbide di-oxide, probably mixed with ammonia." Other suggestions have been chlorine, bromine, sulphur dioxide, nitrogen peroxide, carbon monoxide, and carbonyl chloride. Some of these substances, for example carbon-monoxide, would, by themselves, not account for the appearance of the gas as reported, while others, for example nitrogen peroxide and carbonyl chloride, would probably be too difficult and expensive to prepare. Chlorine certainly seems the likeliest of the lot, but it is, of course, not in the least certain that it was an inorganic substance at all. This leads us to the suggestion which we would commend to the attention of military correspondents and others that, by discharging volumes of ammonia gas in reply to the enemy's chlorine, we could confound his chemistry. The resulting sal-ammoniac could be collected afterwards and used for the trench telephones.—*The Engineer*, 4/30.

NAVAL LESSONS OF THE WAR

SUMMARY OF WAR ACHIEVEMENTS.—The present offers a proper time to consider what the ten months of horror have achieved. The record shows a vast preponderance of advantage in favor of the Teuton Allies. Germany holds the greater part of Belgium, a fair portion of France, a large part of Poland. The Fatherland is thus far intact and may prove to be impregnable. In case, with increasing strength of the Allies, and in view of the settled policy of Germany, which has been turning the neutrals of all nations into avowed or unavowed hostility, the tide should turn (as it surely must) what can the result be? Will there follow a higher and better order of things? What will the Europe of to-morrow be like? The flower of manhood in Europe is being destroyed by the thousands and tens of thousands, the land is being laid waste, whole peoples are dying of want and hunger, the destruction of material wealth is going on at an unprecedented rate. The national debt of the warring nations is reaching untold sums. The bills must be paid, not only by the present, but by future generations. Will not the burden be too great for the people to bear? The future of Europe seems dark indeed. Although the material destruction that has already taken place is figured coldly in the newspapers in millions and billions of dollars, and has involved the complete wiping out of some of the most beautiful cities of Europe, this may prove to be but the beginning; for there is ever growing evidence that the war is to be a protracted one.

This material loss, enormous and ever increasing, is not the only or even

the saddest burden of the war. Equalling appalling is the moral cataclysm which has taken place—the loss of faith in human nature, the breakdown in the sacredness of treaties and contracts, the race hatred that has been engendered, the overturning of ideals, and the setback to the advancement of civilization. How changed would be the conditions if the war were being waged for high principles from which some lesson of right or wrong might be learned. It might then be hoped that some basis might be reached for the establishment of a permanent peace. It seems, however, that this cannot now be done except through the sad and awful expedient of the complete exhaustion and subjection of one or the other of the warring nations. Will the nations of the future, the new nations that must be born out of the ashes of the present terrible struggle, hold to a simpler creed and a higher diplomacy, substituting the new diplomacy of truth for that of deception? Will they have higher ideals of human faith and responsibility? Shall we witness the birth of a new era, in which will be found a greater belief in, a higher regard for and a more human sympathy with one's neighbor, even though he be of foreign blood? Perhaps, when the great bitterness of the struggle is over and the waste and futility and sin of it all are understood, some such readjustment of the world's ideals may follow.—*Scientific American, 6/12.*

WHEN THE GERMAN FLEET COMES OUT.—The forlorn hope has no part in the scheme of German tactics either on sea or land. Even when she has hurled her men in masses against seemingly impregnable positions, we may rest assured that her generals have believed that the chances of success were good. As on the land, so on the sea. We may rest assured that Von Tirpitz will never send out the German main fleet for a trial of strength with the British except under conditions which afford a reasonable promise of success.

As matters stand to-day, the German first fighting line includes probably seventeen dreadnoughts; against this force Great Britain could oppose to-day, including ships commissioned since the war began, thirty-eight dreadnoughts. In point of numbers of ships, this means a superiority of over two to one; but if we take into consideration the heavier batteries and higher speed of the later British ships, the actual fighting superiority is about three to one.

As to the future, it is certain that the longer the war lasts the greater will be the British advantage; for under the accelerated rate of construction she is adding to her main fleet at the rate of over one dreadnought per month.

Is the German main fleet, then, destined to spend the long years of this war condemned to hopeless inactivity within its own harbors and roadsteads? We doubt it. On the contrary, we believe that, when the readjusted plans of the German Admiralty are ripe for prosecution, the German fleet will issue forth in full force for a great trial of strength along those strategical and tactical lines which, under the present naval conditions in the North Sea, alone can offer her any chance of victory.

The proposed scheme of German naval operations prior to the war was to reduce the British battleship strength by ceaseless destroyer and submarine attacks, and when this process of attrition had reached the desired point to issue forth for a line-of-battle engagement. So far as the German destroyers are concerned, the results have been practically *nil;* the submarine, on the other hand, in the early stages of the war and before the British had learned by experience how to meet this form of attack, scored some very notable successes. For several months, however, at least in the North Sea and around the British Islands, submarine activity against the fighting fleet has produced no recorded results. Failing against their legitimate prey, the German submarines turned savagely upon the unarmed merchantmen of the enemy.

We offer it as a plausible, if not a probable theory, that the German tactics, when the great sea fight comes off, were foreshadowed in the operations of the German battle-cruiser fleet a few months ago in the North Sea. We believe that the raiding of undefended towns on the east coast of England was not so much an exhibition of what has been termed German "frightfulness" as it was the preliminary stage of a German strategy, which was designed to draw the British fleet into action and lead it a stern chase into waters where flotillas of German submarines awaited its coming. This theory would explain two very remarkable facts which certainly seem to require explanation, connected with that running fight across the North Sea. The first of these was the complete abandonment, by the powerful German armored battle-cruisers, of the unfortunate *Bluecher*, whose destruction was certain as soon as they drew away from her. The other, and more astonishing fact, is that after the flagship *Lion* had been put out of action by a shot in her engine room, and the odds, so far as the ships engaged were concerned, were three German to two British ships, the Germans, with an advantage of twenty-eight armor-piercing guns against only sixteen on the two British cruisers, failed to close in and attempt to sink the enemy with an overwhelming superiority of gunfire.

For it should be noted that the 29-knot battle-cruisers, *Doerflinger, Seydlitz,* and *Moltke, Princess Royal* and *Tiger,* had pulled out far ahead of the slower *Bluecher, New Zealand,* and *Indomitable.* When the *Lion* was disabled, therefore, these German battle-cruisers were able to oppose eight 50-caliber 12-inch and twenty 50-caliber 11-inch armor-piercing guns to the sixteen 13.5-inch armor-piercing guns carried by the two British ships. If the Germans had immediately closed in to nine or ten thousand yards, their guns would have been able to penetrate the 9-inch belt armor of the British ships with ease; and with a superiority of twenty-eight guns to sixteen, and anything like equal shooting, the result would have been a foregone conclusion.

Why did not the German admiral seize such a tempting opportunity? Certainly not from fear of the British fire—that has never been a German characteristic. We are inclined to believe that, in continuing his flight, the German admiral was acting under strict orders and according to a predetermined plan, which was to lead the British fleet into waters where a flotilla, or perhaps several flotillas, of German submarines were gathered. That this was the plan is suggested by the fact that the British ships did run up to a group of submarines, and indeed came so near to running through them, that Admiral Beatty from the bridge of the *Princess Royal* saw the streak of an approaching torpedo, and only by a quick turn of the helm avoided it.

It is possible and, to our minds, rather probable, that the German Admiralty, realizing the hopelessness of any attempt to gain equal strength with the British in capital ships, is devoting the whole of the country's shipbuilding strength to the construction of submarines of the greatest size, speed, radius of action, and torpedo-carrying capacity. At the opening of the war, Germany probably did not have over twenty-five submarines in commission. If, early in the war, she ceased the construction of capital ships and devoted her whole energy to the construction of a vast submarine fleet, it is possible that she may have over a hundred of these craft to-day in commission, and this in spite of her many losses. It is conceivable she may have another hundred or even more under construction. Undoubtedly as fast as they are completed and the crews can be found, the new boats are put into commission. It cannot be disputed that the work of hunting down and sinking the merchant ships of the enemy affords the German submarine fleet every opportunity to become proficient in maneuvering and torpedo practice.

Now if this be the German plan, it can be seen at once that the military value, in the way of training the crews and the shaking down of the submarines into thoroughly serviceable condition, which is involved in this far-flung series of operations directed against merchant ships, is of far more

value to Germany than the mere loss by the enemy of 2 or 3 or even 5 per cent of his merchant fleet.

When Germany feels that her submarine fleet is sufficiently numerous and its personnel fully efficient for the prosecution of her long-deferred offensive, we may look for a general calling in of the raiders to the home ports, and a sudden cessation of the sinking of merchant ships. Whenever that occurs, it will be reasonable to watch for the exit of the whole German fleet in full strength to seek and get in contact with the enemy. Contact once secured, we may expect a repetition on a grand scale of the tactics employed in the recent battle-cruiser engagement. There will, conceivably, be a pretended flight of the German fleet from superior forces and an attempt to lead Admiral Jellicoe and the fighting forces under his command into a veritable shoal of submarines.

Should the German ruse prove successful, and the British destroyers fail to locate the submarines and give timely warning, it is conceivable that within a short time after it ran into the snare, 50 per cent of the British fleet would be out of action. Admiral Jellicoe and his staff, however, are perfectly familiar with all the possibilities above suggested; and it is conceivable that, in spite of his enormous superiority in strength, he might refuse to follow the German lead.

Some day and under conditions which suit themselves, the Germans will come out into the North Sea in full strength; and when that happens the world will witness a series of maneuvers and a great battle or series of battles which, in point of interest, novelty of conditions, and frightful destructiveness, will set a new mark in the history of naval warfare.—*Scientific American*, 6/12.

SUBMARINE'S CRUISING RADIUS.—Engineering quotes the following from the March issue of the *Revista Marittima*: "If we consider an 800-ton submarine, propelled by Diesel motors, and having a cruising speed of 8 knots on the surface, the power developed does not exceed 250 horsepower, and the oil fuel consumption is at most 10 kilograms per mile. On this basis, for every 1000 miles the oil fuel consumed is ten tons. Considering that the boat probably carries a normal supply of 50 tons, she would have a radius of action of at least 5000 miles, equivalent to over 600 hours of constant navigation at 8 knots. If, moreover, the water-ballast tanks be filled with oil the very great increase in radius of action thereby made possible is obvious. In fact, the radius of action appears now to be limited only by the power of resistance of the crew." It should be pointed out that 600 hours at 8 knots is equivalent to 5527 miles.—*United Service Magazine*, May.

The story from Berlin in the *Berliner Tageblatt* claiming that a German submarine in sinking the British battleship *Triumph* off the Dardanelles must have cruised upward of 3400 miles from the North Sea, around Gibraltar to the Dardanelles, and all under her own power, without stopping at a supply station, is not believed by officers of the United States Navy expert in submarine navigation. If the submarine which sunk the *Triumph* did not come from Constantinople it probably was an Austrian submarine, it is held. The trip from the Austrian coast down to the Dardanelles, it is pointed out, would be very much easier and more rational than the trip from Germany, which would make rounding the north end of Scotland also necessary, in view of the closed lane from Dover to Calais. It is known that German submarines were shipped to Constantinople in parts and were put together and launched there, and that German officers and mechanicians went overland to man them.—*Army and Navy Journal*, 6/5.

LESSONS OF THE "GOLIATH" DISASTER. *The Importance of the Destroyer.*—In connection with the sinking of H. M. S. *Goliath* with at least 500 gallant officers and men, there are lessons which we should do well

to take to heart. A fleet with such world-wide preoccupations as ours is daily and hourly exposed to grave perils. Unquestionably we enjoy the incalculable advantage of commanding the sea, but it is an advantage for which a heavy price is inevitably exacted.

The torpedoing of the *Goliath* is of importance in that it constitutes the first instance of a successful destroyer attack in the European theatre of war. As readers are aware, the Germans claim to have torpedoed the Japanese cruiser *Takachiho* near Kiao-chau Bay, shortly before the surrender of that fortress. The attacking boat was the old *S 10*, and a full translation of the commander's report of the affair was given in these columns. On the other hand, the Japanese authorities attributed the loss of the cruiser to a mine. It must, therefore, remain an open question whether the *Takachiho* was mined or torpedoed.

Fortunately the information about the *Goliath* is more definite, the Admiralty having stated explicitly that she was sunk by Turkish destroyers. The Ottoman Navy includes several modern boats, the most formidable being the four 620-ton destroyers originally built for the German fleet as *S* 165-*S* 168, and sold to the Turks in the summer of 1910. They have a paper speed of 35 knots, and carry three 18-inch tubes. No doubt they are now manned for the most part by Germans. The Turkish *communiqué* announcing the destruction of the *Goliath* did not reveal the identity of the attacking craft, but merely stated that the battleship was struck by three torpedoes. Unfortunately the conditions in the Dardanelles are such as to offer good prospects to such attacks, for our ships in the Straits have but little sea room, and enemy destroyers can dash out from the shelter of their minefields, deliver their assault, and retire without having to fear serious pursuit.

Nevertheless, the Turkish boats on this occasion must have been smartly handled. The only antidote to such attempts is the presence of a large number of destroyers with the Allied fleet, and it is devoutly to be hoped that an adequate supply is available. Not until the war is over shall we know of the prominent part the destroyer has played. Before the war there used to be periodical discussions as to the exact number we needed, and there was a tendency to apply the two-keels-to-one standard to destroyers as well as to capital ships. Wisdom has come with the "real thing," and it is probably a safe suggestion that had our establishment in destroyers been four or six times as great as it was, every single boat could have been profitably employed. The submarine has created a new sphere of usefulness for the destroyer. Waters known to haunted by these swift, handy craft are sedulously avoided by the submarine. But it is clear that however pressing the demand for an adequate force of patrols to guard our shipping against the enemy's underwater piracy, it must not be met at the expense of the grand fleet.

But the sinking of the *Goliath* serves to remind us that the destroyer, when in capable hands, is still a formidable instrument. In August last Germany possessed over 100 boats of 30 knots and more, and a large number of new destroyers were due to be completed within the succeeding twelve months. Including some earlier craft of 27 knots speed, the grand total of effective German destroyers must now exceed 150. The success of the attack on the *Goliath* may inspire the enemy to repeat the attempt nearer home. His best boats are not being risked in the open. His occasional excursions into the southern area of the North Sea, which usually end in disaster, appear to be made by small torpedo-boats of minor value, seventy of which were on the active list last August. Moreover, several new boats of small dimensions have been constructed at the Cockerill yard on the Scheldt, according to trustworthy information. A recent photograph of one such boat, said to have been taken as she was leaving the yard at Antwerp, shows the new type to have a displacement of about 150 tons. The single funnel and turtle-deck have a strangely un-German appearance. As the two German "torpedo-boats" which were

chased and sunk near the North Hinder lightship on May 1 have not been specified by the Admiralty, they may possibly have been of this new and hitherto unknown type. In the German account they were referred to as "Vorposten-Boote," or outpost boats, but as this was doubtless a euphemism to deceive the German public.

At the same time everything points to an unwillingness on the part of the enemy to expose his really effective destroyers, and the only conclusion to be drawn from this attitude is that the entire flotilla is being kept intact and in readiness for a big combined move at the first promising opportunity. On each of the three occasions that German capital ships have made an attempt against the east coast they were accompanied by strong forces of torpedo craft, there being at least 25 to 30 boats attached to the battle-cruiser squadron under Rear Admiral Hipper on January 24. Sir David Beatty's report on the engagement spoke of enemy destroyers attempting to attack. Their mission, no doubt, was to impede the pursuit of the flying battle-cruisers, and, if need be, to sacrifice themselves for this purpose.

Should Admiral Pohl ever essay the great adventure he is likely to come out surrounded by a cloud of destroyers, for a regular feature of German naval maneuvers in recent years was the close co-operation between the big ships and their mosquito attendants. In order to clear the field and allow full play to our superiority in capital ships, we shall need a huge counter-fource of destroyers and light cruisers. Considering the vast resources of the country in this particular class of naval construction, it may be confidently hoped that the critical period will find our light flotillas numerically equal to every demand made upon them.—HECTOR C. BYWATER, *Naval and Military Record*, 3/7.

It is considered the war has also added to the prestige of the speedy and relatively robust destroyer, fitted both for scouting work and for action against submarines by his reduced vulnerability to underwater attacks and armament of quick-firers of ever-growing calibers. This lends interest to the launching at Rochefort of the *Mécanicien-Principal-Lestin*. This contretorpilleur, which revives the name of a brave officer of the *Liberté*, who cheerfully went to death in a desperate attempt at saving his burning ship, is our largest and most robustly constructed destroyer, having a displacement of 895 metric tons, thus 200 tons more than the *Bouclier* (1911), though the armament remains unchanged, consisting of two guns of 4-inch bore, placed high above the water-line on raised platforms, and of four 9-pounders, besides four torpedo-tubes. The speed, 31 knots, has not been increased on paper, but in practice it will be found to be more reliable than in the fragile early boats of the class, as the motor power has passed from 16,000 to 20,000 horse-power. Some light has been thrown on this point by the comparative performances of the latest British boats, which have conclusively demonstrated in their actions against German rivals that robust hulls and motors count for more at sea than the finest trial achievements. The *Lestin* is rather inferior in armament and sea-keeping qualities to her British contemporaries that embody the data of a longer and more comprehensive experience in that class of construction, but she will nevertheless, together with her sisters *Roux* and *Gabolde*, prove a welcome addition to our flotillas and more than a match for Austro-German destroyers. A new destroyer policy is contemplated that will do justice to the importance of the type. With the proposed armament of 5.5-inch guns and the consequent increase of the displacement, our future contre-torpilleurs will be in reality small scouts, much stronger and faster at sea than the predecessors, but also more vulnerable to underwater attacks.—*Naval and Military Record*, 5/26.

LESSONS OF THE "TRIUMPH" DISASTER: TORPEDO NETS INEFFECTIVE.—Details are now available which apparently confirm the Turkish official statement that the battleship *Triumph* had her torpedo nets out when she was attacked. It appears that the battleship was lying off Gaba Tepe,

stationary but not anchored, when the approach of a torpedo was noticed. It was stated that one of the ship's light guns immediately opened fire, one shot missing the torpedo only by about two inches. This first torpedo cut through the netting, and a second and third missile fired, it is said, almost simultaneously, passed through the same hole. The incident, if these be the real facts, is a very remarkable one. In the first place, the attack was made in broad daylight, and in the second the submarine was, according to survivors, not seen. Again, the torpedo net proved no adequate defence, and three missiles went through the same hole in the netting. Evidently the submarine made the attack at close quarters, even though we reject the statement that the three torpedoes were fired "almost simultaneously." But the main fact which emerges from the incident is that the *Triumph* had her nets out, and that the German torpedoes succeeded in cutting their way through them. Some years ago the American naval authorities came to the conclusion that the day of the torpedo net was at an end, and it was consequently abandoned. It was urged in opposition to this course that, even though the net might prove susceptible to the cutter, then recently introduced, it possessed a psychological influence which, in view of the development of the submarine, it would not be wise to ignore. It gave to the crews of the battleships, it was urged, a sense of security against attack by torpedo which otherwise they would not possess, and this feeling of confidence, it was added, was an element of military value. Whatever may have been the rights in this discussion, we now have evidence, if the statements with reference to the *Triumph* may be accepted, that the net, which is not used without inconvenience, is of little or no value.—*Naval and Military Record*, 6/9.

LANDING AT DARDANELLES. BADLY LADEN TRANSPORTS.—It is at this point that the general's despatch, everywhere else so clear and vivid, contains an ambiguous and yet significant passage. He says that it now became necessary "to redistribute the troops on the transports to suit the order of their disembarkation." What are we to understand by this? The troops had for the most part come direct from Egypt to the Dardanelles, and the nature of the operations upon which they were to be employed must have been clear to the minds of the most subordinate of the embarkation staff at Alexandria; and it seems impossible that there should have been any serious mixing up of units which could not have been straightened out even in a place like Mudros, where the harbor facilities do not compare with those of Southampton. It is, however, no secret, and has, indeed, been generally known for some time, that the transports had been so badly loaded when they first left Alexandria, that stores urgently wanted at the very outset of operations had been placed at the very bottom of the holds, while above them had been loaded articles intended for the supply of an army for many months. The real reason, then, why at this important juncture Sir Ian Hamilton found it necessary to carry almost the whole of his force back to Egypt, and thus delay for more than a month the commencement of the task he had been directed to undertake, was simply that the transports might be emptied in order that the stevedores should do their loading all over again in a proper and methodical manner, suited to the military character of the expedition and of the contents of the ships.—*Army and Navy Gazette*, 7/10.

FORCING THE DARDANELLES.—In the new number of *The Contemporary Review*, Col. Maude, R. E., has an article in which he discusses the operations in the Dardanelles. In the first place he emphasizes the importance of the results of the operation—political, military, and economic. He boldly discusses the wisdom or unwisdom of the effort to force the Straits by warships, unsupported by adequate landing parties. His conclusion is of interest, resting as it does upon the experience of an officer of high attainments as a military engineer. "I firmly believe," he declares, "that

had we taken the bull by the horns and steamed right into the Straits, choosing our weather and using all the navy tricks of dummy ships of which we heard so much in peace time—the odds are very great—but that we should have reached Constantinople with fewer casualties in ships than we have actually suffered up to the present time." No officer of the navy or the army has yet made so unequivocable a declaration. Col. Maude, however, hastens to add, that "presumably, however, other factors intervened of which we have no knowledge, for it is far from my purpose to suggest any want of boldness in our officers." The writer states that he has only put the case in this form in order to make it clear that at the time the decision to attack the Dardanelles was formed there were no reasons, of which the authorities in England were cognizant, to justify the opinions as to the culpability in ordering the expedition which have since been expressed. Col. Maude. we think, has rather missed the point. The possibility of ships of war forcing their way through the Dardanelles, at some sacrifice, has never been denied; but, having got through, could they have got back again? No admiral jealous of his reputation and of the ships and crews entrusted to his care, could forget the experience of Admiral Duckworth. As many mice have learnt to their cost, it is one thing to get into a trap and quite another to get out again.—*Naval and Military Record, 6/9.*

HIGH SPEED AND SUPERIOR GUN POWER.—The Paris *Ecole Superieure de la Marine* has long held that "speed is not a weapon, but, other things being equal, it adds to the efficiency of the armament and confers an advantage to the side possessing it." This contention has been shown by recent events to rest on a solid foundation. German scouts and battle-cruisers as well as Austrian scouts, which have repeatedly ventured to sea, have been able to make nothing out of their fine steaming qualities by reason of their inferior armament, whilst, on the other hand, British cruisers and even destroyers are every day making an excellent utilization of their high speed, which is backed by superior gun power. Speed in itself is of small moment, and, moreover, it is seen to only favor the side assuming the offensive.—*Naval and Military Record.*

BATTLESHIPS STILL PREDOMINANT.—A striking admission by Count Reventlow that submarines cannot control the seas ought not to escape attention. The count had been discussing a lecture at Hamburg by the German Colonial Secretary, Dr. Solf, who said that Germany had not the least intention of abandoning her colonies at the peace negotiations, and assuming this to mean that she might make concessions in Western Europe in order to recover her lost colonies, Count Reventlow opposed this policy entirely. His view is that sea power must be Germany's main object, and sea power means an extension of the German Coast. "Colonial possessions will then, of necessity, remain ours," he says, "or will of themselves fall to us as a necessary consequence." Then he proceeds to throw light upon what is meant by naval power, and according to the *Times* of Wednesday last, remarks that, although submarines may dispute an enemy's command of the seas, even German submarines cannot control the seas. If Germany trebled the number of her submarines, she could not protect colonies with them, he admits, and he concludes that "what Germany really needs is a dozen more battleships." To base any policy, says the count, upon the hope that it will be impossible to discover effective replies to submarines is "sheer folly." From this it would seem that German writers are beginning to grasp a truth which has always been realized by the majority of British naval officers, that the command of the seas is not yet to be determined by other than big ships. Whatever successes the submarine may gain in this war, it is with the grand fleet under Sir John Jellico which will dominate the naval situation so long as it remains in being and undefeated. It may

flatter the pride of the Germans to think they can circumvent the power and influence of that fleet by such novel and unlawful schemes as a submarine "blockade," but they must know full well that the only relief from the pressure is to be obtained by fighting for the control of the sea outlets. That they have not up to the present done so has been taken as evidence in support of one of two theories. Even the military strategists whose views are predominant in the conduct of the war undervalued the importance of keeping open the sea communications, and therefore kept back the fleet in spite of the fact that the British forces were daily growing stronger; or else there was no settled plan as to how the German Navy was to be used to attain the objects for which it was built.—*Army and Navy Gazette*, 5/22.

THE SUPER-BATTLE-CRUISER.—That the leading naval power in the world is satisfied that the battle-cruiser has fully vindicated the claims of those who were responsible for its introduction, is proved by the fact that the British Admiralty is completing four ships of this type in which the elements of speed and gun-fire will be carried such a great step in advance as to place the new ships in a class by themselves. Indeed, if there be such a vessel as a super-dreadnought, it is certain that these ships should be termed super-battle-cruisers.

We are reliably informed that this group of ships is being rushed to completion, and that the extreme features which they embody in the way of gun-fire and high speed were decided upon as the result of experience gained during the present war. They are to mount the 15-inch gun, and they are designed to steam at a sustained sea speed of 32 knots. The armor protection is to be of a moderate thickness, necessarily. Now here we have a ship which will have the widest possible range of usefulness outside of the line-of-battle engagement between heavily armored dreadnoughts. Thus, if the German battle-cruisers should attempt another raid on the English coast, the 32-knot ships, if they get in touch, could easily overtake and sink them. They could catch and sink the fastest of the modern scouts; and in any but the calmest weather could round up and dispose of a whole fleet of torpedo-boat destroyers, whatever their speed might be. Also, if their own fleet were pursuing a battleship column, they could overtake and concentrate on the rearmost ships, thereby forcing the enemy to accept engagement—unless, indeed, the enemy admiral should leave his rear to shift for itself, as was done by the German battle-cruisers when they left the *Bluecher* to its fate in the North Sea battle.—*Scientific American*, 6/5.

INTERNED SHIPS.—The escape and capture of the *Macedonia*, and the abortive attempt of the *Odenwald* to get away from San Juan, have raised the question as to which is the most effective method of interning a ship. In the cases mentioned, the custom of removing portions of the vessels' machinery was, it may be assumed, resorted to. Anyway, the measures taken were insufficient to prevent the ships leaving their anchorages. The naval correspondent of the *Times*, dealing with this matter, says that it might be politely suggested that the most effective way of making temporarily harmless an interned ship is to remove the rudder and keep it in safety during the period of hostilities. Parts of machinery may apparently be replaced, as is shown not only by what happened to the ships referred to, but also in the case of the British steamer *Southport*, which vessel, having been captured and taken to the Caroline Islands by the German gunboat *Geier*, had her engines patched up by her own crew sufficiently to enable her to limp back to Brisbane. No rudder, however, could very well be substituted without exciting public attention. In another way, there would seem to be different interpretations of the law of internment held in the various countries. The fact that the *Macedonia* and *Odenwald* could be moved proves their crews to have been still at liberty. Similarly,

the officers and men of the *Kronprinz Wilhelm* and *Prinz Eitel Friedrich* enjoy their freedom, and could, if they so desired, return to Europe, it would seem, in passenger ships to resume warlike proceedings. Yet when the British naval brigades at the defence of Antwerp trespassed by mistake on Dutch territory, they were required to surrender their arms and be confined until the end of the war. The difference is due, it seems, to the stricter view of the requirements of neutrality which evidently prevails with the authorities in Holland as compared with the Spanish and United States Governments.—*Army and Navy Gazette*, 5/15.

SUBMARINE MANEUVERED WITHOUT SHOWING PERISCOPE.—With regard to some facts of very great interest in connection with the submarine "blockade," an officer in the merchant service has been permitted to lift the veil in recording his experiences in an article which appears in the June number of *The Nautical Magazine* under the heading "Submarined." The author was on duty on the bridge of a steamer that was torpedoed at the mouth of the Bristol Channel on the afternoon of a lovely clear day, when "the horizon was plain all round, the sea being quite calm." In spite of a vigilant lookout, no submarine had been sighted, and no indication of the presence of an enemy craft observed until there was suddenly seen what was first taken to be a fish coming to the surface from a depth of three or four fathoms. "Then, like a flash," says the writer, "I noticed that the disturbance of the water increased, and I could see the shimmering body of a torpedo coming, as it seemed, from the depths of the sea at an angle of some 45 degrees . . . . A terrific explosion rent the air, and the force of it swept up the water like a huge cataract and sent above the height of the funnel a shower which descended upon me, drenching me to the skin." It was not until the crew of the steamer had entered their boats and were pulling away from the ship that the periscope of the enemy was sighted. The submarine, which shortly afterwards appeared, is described as "a huge vessel and carried a heavily mounted gun," and it is an interesting fact, in view of all that has been written on the subject, that "this gun was in no way covered up, for before the periscope of the submarine came to the surface it showed itself in position." As the result of his experience the writer of the article mentions as a curious feature the absence of the submarine's periscope, and remarks, "I should imagine that the submarine was fitted with some kind of plate-glass lookout in the conning-tower, where she could see the object of her prey through the water."—*Naval and Military Record*, 6/16.

LOSS OF "LUSITANIA." (POINTS OF PROFESSIONAL INTEREST.) *Captain's Account.*—At the inquest on May 10, Captain W. T. Turner, who was in command of the *Lusitania* said:

"The weather was clear, and we were going at a speed of eighteen knots. I was on the port side, and I heard the second officer, Hefford, call out, "Here's a torpedo." I ran over to the other side and saw clearly the wake of the torpedo. Smoke and steam came up between the two last funnels, and there was a slight shock. Immediately after the first explosion there was another report, but that might possibly have been internal.

She floated about eighteen minutes after the torpedo struck her. No warship was convoying us. I saw no warship; none was reported to me as having been seen. Eighteen knots was not the normal speed of the *Lusitania*. At ordinary peace times she could make twenty-five knots, but in war time her speed was reduced to twenty-one knots. My reason for going eighteen knots was that I wanted to arrive at Liverpool Bar without stopping, and within two or three hours of high water. Double look-outs were kept for submarines, but we were not going a zig-zag course. It was bright weather, and the land was clearly visible. It was quite possible for a submarine to approach without being seen."—*Army and Navy Gazette*, 5/15.

The ethics of the affair apart, there are two features about the disaster which cannot fail to evoke surprise. In the first place it is difficult to understand how the great Cunarder came to be torpedoed at all. Hitherto it was generally believed that a speed above 16 or 17 knots rendered a ship virtually safe from this form of attack. The slower the vessel the easier the target she presented to a submarine, and on every previous occasion of which we have any record the victim was struck when steaming at less than 16 knots. Now the *Lusitania* could easily do 25, and had done 26 knots. Whether she was running at anything like this speed when the fatal torpedo got home we do not yet know. According to one survivor, a member of the crew, the liner was doing "about 16 knots" at the time. This statement needs to be accepted with reserve. Fog may have had something to do with the matter, but it is pretty obvious that none but considerations of the utmost moment would have induced the captain voluntarily to slow down in an area known to be well within the striking radius of the German submarines. Until there is definite information to go upon, all speculation is more or less idle; but the vital importance of establishing the speed of the *Lusitania* at the moment she was struck is undeniable. Should it transpire that she was travelling at a much higher velocity than 16 knots, the fact could not fail to influence existing principles of anti-submarine defence.

The second surprising feature is the rapidity with which the huge liner succumbed. Accounts differ as to the number of torpedoes fired, but the majority of the survivors say there were two. Even so, that a vessel of 32,500 gross tonnage should go to the bottom in little more than half an hour after receiving two torpedoes is a startling indication of the power of these German weapons. It seems to bear out the theory advanced in some quarters of a special torpedo for submarine use, whose very limited range is compensated by a specially destructive warhead, contanining about 400 pounds of trinitrotoluol. Two charges of this size might be depended on to blow a huge section of the hull away and play such havoc with bulkheads as to destroy the floatability almost at once. The use of such torpedoes is a further tribute to the practical science of the German technical authorities. Whether our Whiteheads are equally potent remains to be seen. Unfortunately the enemy is not obliging enough to offer them a target. In the earlier stage of the war the British torpedoes seem to have been less destructive, for both the *Hela*, a small light cruiser, and the German destroyer torpedoed off Borkum kept afloat for quite a respectable time. Curiously enough, the *Recruit*, which was similarly attacked on May 1, remained above water long enough to enable part of the crew to be taken off. Past experience seems to suggest that the bigger the ship the more easily she is sunk by under-water attack, possibly because the big ship offers a more "solid" target than the small, and does not "give" to the explosion, which consequently develops its full energy.—*Naval and Military Record*, 5/12.

PROTECTION AGAINST SUBMARINES BY AERO-BOMBS.—From all parts of the British Empire the Admiralty is no doubt receiving suggestions as to new ways of destroying submarines and thus protecting not only ships of his Majesty's Navy, but vessels of the mercantile marine. Most of these ideas are impracticable, their originators having insufficient knowledge of sea conditions and the circumstances in which naval warfare is conducted. On the other hand, Mr. L. Blin Desbleds, well known as a lecturer on aeronautics, has put forward a scheme for meeting the submarine warfare on commerce by the employment in a special manner of aeroplanes carrying anti-submarine bombs. Writing in *The Syren*, he advocates the formation of a national air service, operating with the sanction of the government, and controlled by a central body, but so constituted as to permit initiative on the part of each local air squadron. In effect, he proposes to utilize the volunteer spirit for the creation of an auxiliary air service;

just as every town of importance has its territorials, so every seaport of any consequence would have its air squadron. He points out that a modern aeroplane can easily fly for five hours at an average speed of 70 miles an hour, and carry during a flight of that duration a load of 300 pounds to 400 pounds of bombs or explosives. Such aeroplanes would maintain a reconnaissance in territorial waters, observing the movements of submarines, transmitting their observations by wireless, convoying merchantmen, and in favorable circumstances attacking the submarines. He calculates that each aeroplane could carry 12 to 16 bombs weighing 25 pounds. Consequently, allowing for reliefs, apparently a dozen aeroplanes could maintain an effective patrol over a comparatively limited water area much frequented by merchant vessels entering and leaving a great port. Ordinary bombs would be useless for such work, but Mr. Desbleds claims that suitable missiles have already been developed, such as the Bragg-Smith bomb, which only explodes after it has penetrated into the water to a predetermined depth. Probably circumstances are not favorable at the moment for the development of such a scheme, but the idea is certainly one which will merit consideration as soon as an opportunity occurs for carrying it into effect.—*Naval and Military Record*, 6/9.

AN ANTI-TORPEDO SUGGESTION

To the Editor of "The Naval and Military Record."

SIR,—May I suggest to the naval authority who is responsible for the safety of H. M. ships and vessels, through the medium of *The Record*, that if in the under-water compartments, between the hull and the inner lining of the ship, balks of timber were laid, so as to partly fill the compartment, it would enormously strengthen the resisting power of the ship if attacked by a torpedo or even a mine. The lifting power of the timber would more than counteract the weight of the water which would enter the compartment. A water-logged timber ship cannot sink. This timber would be more effective than nets in protecting our ships. Instead of letting the timber lie in our dockyards, why not use it in this way I suggest? It is comparatively inexpensive, and the work could all be done in our dockyards. The resisting power of these balks of timber, in addition to that of the hull of the ship, would, in my humble opinion, save many a ship and probably thousands of precious lives.

Sheerness, June 11. HENRY HALL, *Naval and Military Record*, 6/16.

ANTI-TORPEDO PROTECTION.—The torpedoing of the *Gambetta*, and especially that of the *Lusitania*, has naturally called the attention of Paris experts to the vital question of anti-torpedo protection. Whilst a minority contend that the mastodon has had its day, and is, despite all protective devices, only fitted for the rôle of helpless victim under the new conditions of warfare, the most eminent authorities cling to the belief that efficacious means of protection are available which will insure for the battleship, if not complete immunity, at least a reasonable chance to survive one or two hits by a torpedo. Of the three main solutions proposed, ex-Chief Constructor Bertin estimates nets, notwithstanding recent improvements by British makers, to be little more than a cumbrous make-believe that come in for real use only when ships are at anchor. But for considerations of weight and stability he would recommend a double net, the second net always being certain to stop the torpedo that would have passed through the first. Different, however, is in this respect the opinion of the Admiralty, who have decided to fit with nets all our super-dreadnoughts in hand. The armoring of the hull to a great depth under water is out of the question, considering speed requirements and the growing portion of the displacement that will have to be devoted to the protection of the waterline and sides against the monster shells of to-morrow, without mentioning the defence against aerial projectiles that calls for urgent consideration

and further complicates the task of the constructor. The true solution to the problem of anti-torpedo defence Monsieur Bertin sees in the improvement of the watertight compartment system, strengthened by armored bulkheads, which, unlike nets, constitutes a defence ever ready when wanted, whilst being more economical in the matter of weight and cost than the outer armored shell preferred by some. To her well-designed forward compartments and robust bulkheads the *Bart* owed her escape of the fate of the *Gambetta*.. It has been claimed here that our *Normandies* are in this respect mare favored than their foreign rivals, and they have even been termed "unsinkable." Still, when it is remembered that they are inferior in displacement to their British contemporaries, and carry nearly the same armament as the U. S. *Pennsylvania*, larger by over 6000 tons, there seems to be little ground for a contention of that sort, though the French Navy no doubt has made good use of the data derived from experiments made at Lorient in the *Henry IV*, *Mirabeau*, and lately in the *Gascogne*.

The loss of the *Gambetta* has given rise to interesting comments in Paris journals, critics being hopelessly divided on the question whether the disaster was avoidable, whether it was to be ascribed to a deficiency in the matériel or to imprudence on the part of the command. It has been alleged that the slow speed (7 knots) at which the cruiser was going when torpedoed was the result of either of lack of fuel or of the poor condition of her motors as the result of nine months of constant work at sea. In well-informed circles there is no thought of blaming Rear Admiral Sénès, who went down with his ship, and during the present war increased his reputation as an officer of high professional merit. As to the absence of contre-torpilleurs with the *Gambetta*,.so much deplored by some, it is due partly to the fact that the French Navy is relatively poor in destroyers, which will be easily understood when it is stated that only three were ordered from 1911 to 1914 (*Roux*, *Lestin*, and *Gabolde*), which is indeed a poor counterpart to the 46 English and 36 German laid down within the same period.—*Naval and Military Record*, 5/19.

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4. SCIENCE CONSPECTUS (Mass. Inst. Tech.), 1915. Present Status of Submarine Boats, by *Wm. Horgaard.*

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10. JOURNAL OF THE AMERICAN SOCIETY OF NAVAL ENGINEERS. **May.**—Heat Transmission and Tube Length in Marine Feed-Water Heaters, by *Leo Loeb, M.E.* Steam Turbine Blade Fastenings, by *Jas. A. Capstaff,* New York Shipbuilding Company. Coal for the Navy, by *Lieutenant Commander J. O. Richardson.* Report of The U. S. Naval Radiotelegraphic Laboratory, by *L. W. Austin,* Head of the Laboratory. Possible Application of the Drzewiecki Method to the Design of Water Propellers, by *Assistant Naval Constructor H. E. Rossell.* U. S. S. *Balch,* by *Henderson B. Gregory.* Gas Analysis, by *W. N. Berkeley, Ph. D.,* Chemist, U. S. Naval Engineering Experiment Station. Descriptions and Trials of U. S. Torpedo-boat Destroyer *Nicholson,* by *Lieutenant W. F. Cochrane.* The Pneumercator, by *Henderson B. Gregory.* Description and Trials of the Torpedo-boat Destroyer *Downes,* by *Lieutenant (J. G.) R. M. Griffin.*

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EUROPEAN WAR NOTES

Compiled by LIEUTENANT C. C. GILL, U. S. Navy

GENERAL ARRANGEMENT

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DIPLOMATIC NOTES

UNITED STATES AND GERMANY

The American Note of **May 15** regarding the loss of American citizens on the *Lusitania* and the methods of German submarine warfare was answered by Germany on **May 29** as follows:

BERLIN, May 29, via LONDON, May 31—1.08 a. m.

The undersigned has the honor to submit to Ambassador Gerard the following answer to the communication of May 15 regarding the injury to American interests through German submarine warfare:

The Imperial Government has subjected the communication of the American Government to a thorough investigation. It entertains also a keen wish to co-operate in a frank and friendly way in clearing up a possible misunderstanding which may have arisen in the relations between the two governments through the events mentioned by the American Government.

Regarding, firstly, the cases of the American steamers *Cushing* and *Gulflight*, the American Embassy has already been informed that the German Government has no intention of submitting neutral ships in the war zone, which are guilty of no hostile acts, to attacks by a submarine or submarines or aviators. On the contrary, the German forces have repeatedly been instructed most specifically to avoid attacks on such ships.

If neutral ships in recent months have suffered through the German submarine warfare, owing to mistakes in identification, it is a question only of quite isolated and exceptional cases, which can be attributed to the British Government's abuse of flags, together with the suspicious or culpable behavior of the masters of the ships.

The German Government, in all cases in which it has been shown by its investigations that a neutral ship, not itself at fault, was damaged by German submarines or aviators, has expressed regret over the unfortunate accident, and, if justified by conditions, has offered indemnification.

The cases of the *Cushing* and the *Gulflight* will be treated on the same principles.

An investigation of both cases is in progress, the result of which will presently be communicated to the Embassy. The investigation can, if necessary, be supplemented by an international call on the International Commission of Inquiry, as provided by Article III of The Hague agreement of October 18, 1907.

When sinking the British steamer *Falaba,* the commander of the German submarine had the intention of allowing the passengers and crew a full opportunity for a safe escape. Only when the master did not obey the order to heave to, but fled and summoned help by rocket signals, did the German commander order the crew and passengers by signals and megaphone to leave the ship within ten minutes. He actually allowed them twenty-three minutes' time, and fired the torpedo only when suspicious craft were hastening to the assistance of the *Falaba.*

Regarding the loss of life by the sinking of the British passenger steamer *Lusitania,* the German Government has already expressed to the neutral governments concerned its keen regret that citizens of their states lost their lives.

On this occasion the Imperial Government, however, cannot escape the impression that certain important facts having a direct bearing on the sinking of the *Lusitania* may have escaped the attention of the American Government.

In the interest of a clear and complete understanding, which is the aim of both governments, the Imperial Government considers it first necessary to convince itself that the information accessible to both governments about the facts of the case is complete and in accord.

The Government of the United States proceeds on the assumption that the *Lusitania* could be regarded as an ordinary unarmed merchantman. The Imperial Government allows itself in this connection to point out that the *Lusitania* was one of the largest and fastest British merchant ships, built with government funds as an auxiliary cruiser, and carried expressly as such in the "navy list" issued by the British Admiralty.

It is further known to the Imperial Government from trustworthy reports from its agents and neutral passengers, that for a considerable time practically all the more valuable British merchantmen have been equipped with cannon and ammunition and other weapons and manned with persons who have been specially trained in serving guns. The *Lusitania,* too, according to information received here, had cannon aboard which were mounted and concealed below decks.

The Imperial Government, further, has the honor to direct the particular attention of the American Government to the fact that the British Admiralty, in a confidential instruction, issued in February, 1915, recommended its mercantile shipping not only to seek protection under neutral flags and distinguishing marks, but also, while thus disguised, to attack German submarines by ramming. As a special incitation to merchantmen to destroy submarines, the British Government also offered high prizes and has already paid such rewards.

The Imperial Government, in view of these facts, indubitably known to it, is unable to regard British merchantmen in the zone of naval operations specified by the Admiralty Staff of the German Navy as "undefended." German commanders consequently are no longer able to observe the customary regulations of the prize law, which they before always followed.

Finally, the Imperial Government must point out particularly that the *Lusitania* on its last trip, as on earlier occasions, carried Canadian troops and war material, including no less than 5400 cases of ammunition intended for the destruction of the brave German soldiers who are fulfilling their duty with self-sacrifice and devotion in the fatherland's service.

The German Government believes that it was acting in justified self-defence in seeking with all the means of warfare at its disposition to protect the lives of its soldiers by destroying ammunition intended for the enemy.

The British shipping company must have been aware of the danger to which the passengers aboard the *Lusitania* were exposed under these conditions. The company in embarking them, notwithstanding this, attempted deliberately to use the lives of American citizens as protection for the ammunition aboard and acted against the clear provisions of the American law, which expressly prohibits the forwarding of passengers on ships carrying ammunition, and provides a penalty therefor. The company, therefore, is wantonly guilty of the death of so many passengers.

There can be no doubt, according to the definite report of the submarine's commander, which is further confirmed by all other information, that the quick sinking of the *Lusitania* is primarily attributable to the explosion of the ammunition shipment caused by a torpedo. The *Lusitania's* passengers would otherwise, in all human probability, have been saved.

The Imperial Government considers the above-mentioned facts important enough to recommend them to the attentive examination of the American Government.

The Imperial Government, while withholding its final decision on the demands advanced in connection with the sinking of the *Lusitania* until receipt of an answer from the American Government, feels impelled, in conclusion, to recall here and now that it took cognizance with satisfaction of the mediatory proposals submitted by the United States Government to Berlin and London as a basis for a *modus vivendi* for conducting the maritime warfare between Germany and Great Britain.

The Imperial Government, by its readiness to enter upon a discussion of these proposals, then demonstrated its good intentions in ample fashion. The realization of these proposals was defeated, as is well known, by the declinatory attitude of the British Government.

The undersigned takes occasion, et cetera,

JAGOW.

—*N. Y. Times*, 5/31.

GERMAN SUBMARINE SANK "GULFLIGHT"

BERLIN, May 28.

The torpedoing of the American oil steamship *Gulflight* is now established as due to a German submarine, the report of the commander of the submarine in question having been received by the German Admiralty.

The commander reported that when he first saw the *Gulflight* she was being convoyed by two patrol boats, and he concluded that she must be a British vessel or was carrying contraband. The presence of the patrol boats, the commander reported, made closer investigation dangerous.—*N. Y. Times*, 5/29.

The following was the reply of the United States to the German Note of **May 29**:

WASHINGTON, June 9, 1915.

The Government of the United States notes with gratification the full recognition by the Imperial German Government, in discussing the cases of the *Cushing* and the *Gulflight*, of the principle of the freedom of all parts of the open sea to neutral ships and the frank willingness of the Imperial German Government to acknowledge and meet its liability where the fact of attack upon neutral ships which have not been guilty of any hostile act by German air craft or vessels of war is satisfactorily established, and the Government of the United States will in due course lay before the Imperial German Government, as it requests, full information concerning the attack on the steamer *Cushing*.

With regard to the sinking of the steamer *Falaba*, by which an American citizen lost his life, the Government of the United States is surprised to find the Imperial German Government contending that an effort on the part of a merchantman to escape capture and secure assistance alters the obligation of the officer seeking to make the capture in respect of the safety

of the lives of those on board the merchantman, although the vessel has ceased her attempt to escape when torpedoed.

These are not new circumstances. They have been in the minds of statesmen and of international jurists throughout the development of naval warfare, and the Government of the United States does not understand that they have ever been held to alter the principles of humanity upon which it has insisted. Nothing but actual forcible resistance or continued efforts to escape by flight when ordered to stop for the purpose of visit on the part of the merchantman has ever been held to forfeit the lives of her passengers or crew.

The Government of the United States, however, does not understand that the Imperial German Government is seeking in this case to relieve itself of liability, but only intends to set forth the circumstances which led the commander of the submarine to allow himself to be hurried into the course which he took.

Your Excellency's note, in discussing the loss of American lives resulting from the sinking of the steamship *Lusitania*, adverts at some length to certain information which the Imperial German Government has received with regard to the character and outfit of that vessel, and your Excellency expresses the fear that this information may not have been brought to the attention of the United States. It is stated that the *Lusitania* was undoubtedly equipped with masked guns, supplied with trained gunners and special ammunition, transporting troops from Canada, carrying a cargo not permitted under the laws of the United States to a vessel also carrying passengers and serving in virtual effect as an auxiliary to the naval forces of Great Britain.

Fortunately these are matters concerning which the Government of the United States is in a position to give the Imperial German Government official information. Of the facts alleged in your Excellency's note, if true, the Government of the United States would have been bound to take official cognizance in performing its recognized duty as a neutral power and in enforcing its national laws.

It was its duty to see to it that the *Lusitania* was not armed for offensive action; that she was not serving as a transport; that she did not carry a cargo prohibited by the statutes of the United States, and that, if in fact she was a naval vessel of Great Britain she should not receive clearance as a merchantman; and it performed that duty and enforced its statutes with scrupulous vigilance through its regularly constituted officials.

It is able, therefore, to assure the Imperial German Goverment that it has been misinformed. If the Imperial Government should deem itself to be in possession of convincing evidence that the officials of the Government of the United States did not perform these duties with thoroughness the Government of the United States sincerely hopes that it will submit that evidence for consideration.

Whatever may be the contentions of the Imperial German Government regarding the carriage of contraband of war on board the Lusitania or regarding the explosion of that material by the torpedo, it need only be said that in the view of this government these contentions are irrelevant to the question of the legality of the methods used by the German naval authorities in sinking the vessel.

But the sinking of passenger ships involves principles of humanity which throw into the background any special circumstances of detail that may be thought to affect the cases, principles which lift it, as the Imperial German Government will no doubt be quick to recognize and acknowledge, out of the class of ordinary subjects of diplomatic discussion or of international controversy.

Whatever be the other facts regarding the Lusitania, the principal fact is that a great steamer, primarily and chiefly a conveyance for passengers, and carrying more than a thousand souls who had no part or lot in the conduct of the war, was torpedoed and sunk without so much as a

challenge or a warning, and that men, women and children were sent to their death in circumstances unparalleled in modern warfare.

The fact that more than one hundred American citizens were among those who perished made it the duty of the Government of the United States to speak of these things, and once more, with solemn emphasis, to call the attention of the Imperial German Government to the grave responsibility which the Government of the United States conceives that it has incurred in this tragic occurrence, and to the indisputable principle upon which that responsibility rests.

The Government of the United States is contending for something much greater than mere rights of property or privileges of commerce. It is contending for nothing less high and sacred than the rights of humanity, which every government honors itself in respecting and which no government is justified in resigning on behalf of those under its care and authority.

Only her actual resistance to capture or refusal to stop when ordered to do so for the purpose of visit could have afforded the commander of the submarine any justification for so much as putting the lives of those on board the ship in jeopardy.

This principle the Government of the United States understands the explicit instructions issued on August 3, 1914, by the Imperial German Admiralty to its commanders at sea to have recognized and embodied, as do the naval codes of all other nations, and upon it every traveler and seaman had a right to depend. It is upon this principle of humanity, as well as upon the law founded upon this principle, that the United States must stand.

The Government of the United States is happy to observe that your Excellency's note closes with the intimation that the Imperial German Government is willing now, as before, to accept the good offices of the United States in an attempt to come to an understanding with the Government of Great Britain by which the character and conditions of war upon the sea may be changed.

The Government of the United States would consider it a privilege thus to serve its friends and the world. It stands ready at any time to convey to either government any intimation or suggestion the other may be willing to have it convey, and cordially invites the Imperial German Government to make use of its services in this way at its convenience. The whole world is concerned in anything that may bring about even a partial accommodation of interests or in any way mitigate the terrors of the present distressing conflict.

In the meantime, whatever arrangement may happily be made between the parties to the war, and whatever may in the opinion of the Imperial German Government have been the provocation or the circumstantial justification for the past acts of its commanders at sea, the Government of the United States confidently looks to see the justice and humanity of the Government of Germany vindicated in all cases where Americans have been wronged or their rights as neutrals invaded.

The Government of the United States therefore very earnestly and very solemnly renews the representations of its note transmitted to the Imperial German Government on the 15th of May, and relies in these representations upon the principles of humanity, the universally recognized understandings of international law, and the ancient friendship of the German nation.

The Government of the United States cannot admit that the proclamation of a war zone from which neutral ships have been warned to keep away may be made to operate as in any degree an abbreviation of the rights either of American shipmasters or of American citizens bound on lawful errands as passengers on merchant ships of belligerent nationality. It does not understand the Imperial German Government to question those rights. It understands it, also, to accept as established beyond question the principle that the lives of non-combatants cannot lawfully or right-

fully to be put in jeopardy by the capture or destruction of an unresisting merchantman, and to recognize the obligation to take sufficient precaution to ascertain whether a suspected merchantman is of fact of belligerent nationality or is of fact carrying contraband of war under a neutral flag. The Government of the United States deems it reasonable to expect that the Imperial German Government will adopt the measures necessary to put these principles into practice in respect of the safeguarding of American lives and American ships, and asks for assurances that this will be done.

ROBERT LANSING, *Secretary of State ad Interim.*

—*N. Y. Herald*, 6/11.

The German reply to the American Note of **June 9** was despatched **July 9.** After referring to Great Britain's alleged violations of international law, including her unwillingness to accept the Declaration of London, her declaration of a war area in the North Sea, her cutting off of German food supply, and interference with commerce to and from Germany, even through neutral ports, the Note proceeds to justify its submarine warfare as a measure of retaliation. Safety is assured American vessels, provided they be properly marked, notice of their sailing given in advance, and absence of contraband in their cargoes guaranteed by the United States Government. The latter part of the text is as follows:

BERLIN, July 8.

The case of the *Lusitania* shows with horrible clearness to what jeopardizing of human lives the manner of conducting war employed by our adversaries leads. In the most direct contradiction of international law all distinctions between merchantmen and war vessels have been obliterated by the order to British merchantmen to arm themselves and to ram submarines, and the promise of rewards therefor, and neutrals who use merchantmen as travelers thereby have been exposed in an increasing degree to all the dangers of war.

If the commander of the German submarine which destroyed the *Lusitania* had caused the crew and passengers to take to the boats before firing a torpedo this would have meant the sure destruction of his own vessel. After the experiences in sinking much smaller and less seaworthy vessels it was to be expected that a mighty ship like the *Lusitania* would remain above water long enough, even after the torpedoing, to permit passengers to enter the ship's boats. Circumstances of a very peculiar kind, especially the presence on board of large quantities of highly explosive materials [word omitted, possibly "dissipated"] this expectation.

In addition it may be pointed out that if the *Lusitania* had been spared, thousands of cases of munitions would have been sent to Germany's enemies and thereby thousands of German mothers and children robbed of breadwinners.

In the spirit of friendship wherewith the German nation has been imbued toward the Union (United States) and its inhabitants since the earliest days of its existence, the Imperial Government will always be ready to do all it can during the present war also to prevent the jeopardizing of lives of American citizens.

The Imperial Government, therefore, repeats the assurances that American ships will not be hindered in the prosecution of legitimate shipping and the lives of American citizens in neutral vessels shall not be placed in jeopardy.

In order to exclude any unforeseen dangers to American passenger steamers, made possible in view of the conduct of maritime war by Germany's adversaries, German submarines will be instructed to permit the free and safe passage of such passenger steamers when made recognizable by special markings and notified a reasonable time in advance. The Imperial Government, however, confidently hopes that the American Government will assume to guarantee that these vessels have no contraband on board, details of arrangements for the unhampered passage of these vessels to be agreed upon by the naval authorities of both sides.

In order to furnish adequate facilities for travel across the Atlantic for American citizens, the German Government submits for consideration a proposal to increase the number of available steamers by installing in passenger service a reasonable number of neutral steamers under the American flag, the exact number to be agreed upon under the same condition as the above mentioned American steamers.

The Imperial Government believes it can assume that in this manner adequate facilities for travel across the Atlantic Ocean can be afforded American citizens. There would, therefore, appear to be no compelling necessity for American citizens to travel to Europe in time of war on ships carrying an enemy flag. In particular the Imperial Government is unable to admit that American citizens can protect an enemy ship through the mere fact of their presence on board.

Germany merely followed England's example when she declared part of the high seas an area of war. Consequently, accidents suffered by neutrals on enemy ships in this area of war cannot well be judged differently from accidents to which neutrals are at all times exposed at the seat of war on land, when they betake themselves into dangerous localities in spite of previous warnings. If, however, it should not be possible for the American Government to acquire an adequate number of neutral passenger steamers, the Imperial Government is prepared to interpose no objections to the placing under the American flag by the American Government of four enemy passenger steamers for passenger traffic between North America and England. Assurances of "free and safe" passage for American passenger steamers would then extend to apply under the identical pro-conditions to these formerly hostile passenger steamers.

The President of the United States has declared his readiness, in a way deserving of thanks, to communicate and suggest proposals to the Government of Great Britain with particular reference to the alteration of maritime war. The Imperial Government will always be glad to make use of the good offices of the President, and hopes that his efforts in the present case as well as in the direction of the lofty ideal of the freedom of the seas, will lead to an understanding.

The undersigned requests the Ambassador to bring the above to the knowledge of the American Government, and avails himself of the opportunity to renew to his Excellency the assurance of his most distinguished consideration.

VON JAGOW.

STATEMENT OF ADMIRAL VON TRUPPEL IN GERMAN PRESS.—"The kernel of the matter from the German standpoint" said Admiral von Truppel, in closing, "is contained in this question:

"Can we hope, so far as we are able to foresee, to force England to its knees through submarine warfare against her commerce?

"*If the answer is in the negative, our submarines can find better employment against hostile war ships, particularly in the hunting grounds of the Mediterranean, the Dardanelles and the Suez Canal. Submarine warfare against merchantmen in that case could be modified or abandoned to obtain a more favorable neutrality from and the friendship of America, which would be of great value to Germany after the war.*

"If the answer is in the affirmative, then the law of self-preservation would justify us in the situation which England has forced upon us in

using to the fullest extent our superiority in submarines, and we can calmly accept all the consequences of it."—*N. Y. Herald*, 7/3.

"NEBRASKAN" TORPEDOED

LONDON, May 26.

The American steamer *Nebraskan*, Captain Green, from Liverpool May 24 for Delaware Breakwater, was torpedoed May 25 by a submarine at a point 40 miles west-southwest of Fastnet, off the south coast of Ireland. The *Nebraskan* remained afloat and returned to Liverpool. The report of Ambassador Page and Lieutenant J. H. Powers, Naval Attaché, confirmed the statement of the *Nebraskan's* officers that the vessel was torpedoed. On July 16 the German Government sent the following explanation and expression of regret:

"On the evening of May 25, last, the submarine met a steamer bound westward without a flag and with no neutral markings on her freeboard, about 35 nautical miles west of Fastnet Rock. No appliance of any kind for the illumination of the flag or markings was to be seen. In the twilight, which had already set in, the name of the steamer was not visible from the submarine. Since the commander of the submarine was obliged to assume, from his wide experience in the area of maritime war, that only English steamers and no neutral steamers traversed this war area without flag and markings, he attacked the vessel with a torpedo in the conviction that he had an enemy vessel before him.

"Some time after the shot the commander saw the vessel had in the meantime hoisted the American flag. As a consequence he, of course, refrained from any further attack. Since the vessel remained afloat he had no occasion to concern himself further with the boats which had been launched.

"It results from this, without a doubt, that attack on the steamer *Nebraskan* was not meant for the American flag, nor is it traceable to any fault on the part of the commander of the German submarine; but is to be considered an unfortunate accident. The German Government expresses its regret at the occurrence to the Government of the United States of America and declares its readiness to make reparation for the damage thereby sustained by American citizens."

"ARMENIAN" SUNK.—News received on June 30 that the Leyland liner *Armenian*, carrying a cargo of mules from this country to England, had been torpedoed off the coast of Cornwall, with the loss of a number of American citizens, occasioned the fear that the incident might still further aggravate relations between the United States and Germany. That fear, however, was dispelled by later reports, which made it clear that the *Armenian* had been challenged by the submarine and ordered to stop. Only when the order was disobeyed and the vessel attempted to escape did the submarine open fire with shrapnel. It was under this bombardment that most of the lives were lost. The chase lasted an hour, the submarine all the time gaining on the *Armenian*. After the captain had surrendered his vessel, he and his crew were allowed time by the commander of the submarine to leave the ship, whereupon she was sunk by torpedoes. Clearly, then, the submarine in this instance acted in strict accordance with international law, and the principal significance of the incident is that it disproves the German contention that submarines, in the nature of the case, are unable to obey the ordinarily accepted rules of warfare. The fate of the *Armenian* demonstrates that the new large type of German submarine, mounting guns, can fulfil the function of a commerce destroyer almost as effectively as a cruiser.

Later reports state that 29 were lost and 10 injured aboard the *Armenian*, chiefly Americans. The vessel was under operation by the Leyland Line, and not, it seems, under direct charter by the British Government.—*Nation*, 7/8.

"ORDUNA" ATTACK.—A submarine attack made without warning on the British liner *Orduna* off the British coast was reported by passengers when the steamer arrived at New York to-day from Liverpool. The *Orduna* carried 227 passengers, including 21 Americans. The torpedo missed her, and none of a half-dozen shells fired at her when the submarine chased the steamer, took effect, those on the liner said. News of the attack on the *Orduna* upsets the theory of some Washington officials that Germany, while not yielding in the American diplomatic demands that unarmed ships be warned of attack in accordance with international law, is in practice observing that procedure. Acting on instructions received from Secretary of the Treasury McAdoo, Collector of the Port Malone has visited the Cunard liner *Orduna* at her pier at West Fourteenth Street, to investigate the attack made upon the ship by a German submarine, on July 9, off the Irish coast.—*Boston Transcript*, 7/17.

DISPUTE OVER "FRYE" DAMAGES.—A controversy, distinct from that relating to submarine warfare, has continued regarding the method of awarding damages for the sinking of the *William P. Frye* by the *Eitel Friedrich*. Germany, while willing to make reparation for both ship and cargo, maintains in a note of June 7 that the *Frye* must go before the Hamburg prize court. Her contention is that Art. XIII of the Treaty of 1799 gives her the right to stop American ships carrying contraband, and that in case of military necessity the destruction of the ship itself is thus justified.

Secretary Lansing in his reply of June 24 points out, however, that the same article provides:

"In the case supposed of a vessel stopped for articles of contraband, if the master of the vessel stopped will deliver out the goods supposed to be of contraband nature, he shall be permitted to do it, and the vessel shall not in that case be carried into any port, nor further detained, but shall be allowed to proceed on her voyage. . . . .

"It seems clear to the Government of the United States, therefore, that whether the cargo of the *Frye* is regarded as contraband or as non-contraband, the destruction of the vessel was, as stated in my previous communication on this subject, 'a violation of the obligations imposed upon the Imperial German Government under existing treaty stipulations between the United States and Prussia.' . . . .

"The Government of the United States also dissents from the view expressed in your note that 'there would be no foundation for a claim of the American Government unless the prize courts should not grant indemnity in accordance with the treaty.' The claim presented by the American Government is for an indemnity for a violation of a treaty, in distinction from an indemnity in accordance with the treaty, and therefore is a matter for adjustment by direct diplomatic discussion between the two governments, and is in no way dependent upon the action of a German prize court.

"For the reasons above stated the Government of the United States cannot recognize the propriety of submitting the claim presented by it on behalf of the owners and captain of the *Frye* to the German prize court for settlement."

Following is the official text of the latest American note to Germany regarding submarine warfare, which was delivered to the Foreign Office at Berlin yesterday by Ambassador Gerard:

PRESIDENT'S NOTE TO GERMANY OF JULY 21

THE SECRETARY OF STATE TO AMBASSADOR GERARD

DEPARTMENT OF STATE, WASHINGTON, July 21, 1915.

You are instructed to deliver textually the following note to the Minister for Foreign Affairs:

The note of the Imperial German Government, dated July 8, 1915, has received the careful consideration of the Government of the United States,

and it regrets to be obliged to say that it has found it very unsatisfactory, because it fails to meet the real differences between the two Governments and indicates no way in which the accepted principles of law and humanity may be applied in the grave matter in controversy, but proposes, on the contrary, arrangements for a partial suspension of these principles which virtually set them aside.

The Government of the United States notes with satisfaction that the Imperial German Government recognizes without reservation the validity of the principles insisted on in the several communications which this government has addressed to the Imperial German Government with regard to its announcement of a war zone and the use of submarines against merchantmen on the high seas—the principle that the high seas are free; that the character and cargo of a merchantman must first be ascertained before she can be lawfully seized or destroyed, and that the lives of non-combatants may in no case be put in jeopardy unless the vessel resists or seeks to escape after being summoned to submit to examination; for a belligerent act of retaliation is *per se* an act beyond the law, and the defence of an act as retaliatory is an admission that it is illegal.

"Keenly Disappointed" by German Stand.—The Government of the United States is, however, keenly disappointed to find that the Imperial German Government regards itself as in large degree exempt from the obligation to observe these principles, even where neutral vessels are concerned, by what it believes the policy and practice of the Government of Great Britain to be in the present war with regard to neutral commerce. The Imperial German Government will readily understand that the Government of the United States cannot discuss the policy of the Government of Great Britain with regard to neutral trade except with that government itself, and that it must regard the conduct of other belligerent governments as irrelevant to any discussion with the Imperial German Government of what this government regards as grave and unjustifiable violations of the rights of American citizens by German naval commanders. Illegal and inhuman acts, however justifiable they may be thought to be against an enemy who is believed to have acted in contravention of law and humanity, are manifestly indefensible when they deprive neutrals of their acknowledged rights, particularly when they violate the right to life itself. If a belligerent cannot retaliate against an enemy without injuring the lives of neutrals as well as their property, humanity as well as justice and a due regard for the dignity of neutral powers should dictate that the practice be discontinued. If persisted in, it would in such circumstances constitute an unpardonable offence against the sovereignty of the neutral nation affected.

"Principles are Immutable."—The Government of the United States is not unmindful of the extraordinary conditions created by this war or of the radical alterations of circumstance and method of attack produced by the use of instrumentalities of naval warfare which the nations of the world cannot have had in view when the existing rules of international law were formulated, and it is ready to make every reasonable allowance for these novel and unexpected aspects of war at sea; but it cannot consent to abate any essential or fundamental right of its people because of a mere alteration of circumstance. The rights of neutrals in time of war are based upon principle, not upon expediency, and the principles are immutable. It is the duty and obligation of belligerents to find a way to adapt the new circumstances to them.

The events of the past two months have clearly indicated that it is possible and practicable to conduct such submarine operations as have characterized the activity of the Imperial German Navy within the so-called war zone in substantial accord with the accepted practices of regulated warfare. The whole world has looked with interest and increasing satisfaction at the demonstration of that possibility by German naval commanders. It is manifestly possible, therefore, to lift the whole practice of submarine attack above the criticism which it has aroused and remove the chief causes of offence.

In view of the admission of illegality made by the Imperial Government when it pleaded the right of retaliation in defence of its acts, and in view of the manifest possibility of conforming to the established rules of naval warfare, the Government of the United States cannot believe that the Imperial Government will longer refrain from disavowing the wanton act of its naval commander in sinking the *Lusitania* or from offering reparation for the American lives lost, so far as reparation can be made for a needless destruction of human life by an illegal act.

The Government of the United States, while not indifferent to the friendly spirit in which it is made, cannot accept the suggestion of the Imperial German Government that certain vessels be designated and agreed upon which shall be free on the seas now illegally proscribed. The very agreement would, by implication, subject other vessels to illegal attack and would be a curtailment, and therefore an abandonment, of the principles for which this government contends and which in times of calmer counsels every nation would concede as of course.

To Uphold Rights "At Any Cost."—The Government of the United States and the Imperial German Government are contending for the same great object, have long stood together in urging the very principles upon which the Government of the United States now solemnly insists. They are both contending for the freedom of the seas. The Government of the United States will continue to contend for that freedom, from whatever quarter violated, without compromise and at any cost. It invites the practical co-operation of the Imperial German Government at this time when co-operation may accomplish most and this great common object be most strikingly and effectively achieved.

The Imperial German Government expresses the hope that this object may be in some measure accomplished even before the present war ends. It can be. The Government of the United States not only feels obliged to insist upon it, by whomsoever violated or ignored, in the protection of its own citizens, but is also deeply interested in seeing it made practicable between the belligerents themselves, and holds itself ready at any time to act as the common friend who may be privileged to suggest a way.

In the meantime the very value which this government sets upon the long and unbroken friendship between the people and Government of the United States and the people and Government of the German nation impels it to press very solemnly upon the Imperial German Government the necessity for a scrupulous observance of neutral rights in this critical matter. Friendship itself prompts it to say to the Imperial Government that repetition by the commanders of German naval vessels of acts in contravention of those rights must be regarded by the Government of the United States, when they affect American citizens, as deliberately unfriendly.

LANSING.

GREAT BRITAIN

TRADE MEMORANDUM OF JUNE 22

On **June 22** the British Government presented a Memorandum explaining the measures adopted for the restriction of trade with Germany and the concessions granted to American traders. The points made were, in brief, as follows:

(1) No confiscation of ships or cargo; measures taken to facilitate presentation of claims against Crown.

(2) Free passage to Germany of cotton sold before March 2 and shipped not later than March 31, or insured before March 2 and shipped not later than March 16.

(3) Payment of over £450,000 to American claimants; settlement of all claims to date.

(4) Free passage of goods purchased in Germany and lying in neutral ports before March 1, or contracted and paid for and reaching a neutral port of shipment before March 16.

(5) Special treatment of dyestuffs, potash, beet seed, and other products essential to American industry.

(6) In view of greatly increased trade to United States from neutral ports, June 15 justified as final date for passage of goods from Germany; further extension of three months not justified.

(7) Delay in British prize courts due frequently to requests of claimants.

Concessions that are Lacking.—There is nothing in the memorandum submitted by the British Government to indicate that it will make any of the following concessions:

(1) Permit and facilitate the shipment to the United States of goods bought in Germany after March 1 and shipped through a neutral port.

(2) Permit or facilitate the shipment to the United States of goods contracted for before March 1 and shipped through a neutral port if the goods had not been paid for before March 1, and there are approximately $50,000,000 worth of goods embraced in this category.

(3) Permit the shipment now or hereafter of American cotton to Germany, even if consigned to a neutral port.

(4) Permit the shipment of non-contraband goods from the United States to Holland or a neutral country if such goods are destined for, or likely to be sent into Germany.

(5) Recognize the right of the United States as a neutral nation under recognized rules of international law to ship non-contraband goods to Holland, or any of the other neutral nations contiguous to Germany.

The Neutral Blockade.—The United States Government has, and will continue, to freely admit that the British Government has a right to maintain a blockade of the German coast, if enforced effectively and made binding under the requirements of international law. But the United States Government has challenged, and it is understood that it will continue to challenge, any attempt to "blockade" a neutral coast like that of Holland, or that the British Government has any right to prevent innocent shipments coming to, or going from, the United States, by way of Rotterdam, in trade originating in Germany or having its destination there.—*N. Y. Times*, 6/25.

ITALY

TERMS OF TRIPLE ALLIANCE.—An Austro-Hungarian "White Paper" reproduced in the *Vossische Zeitung* of May 27 gives the following three clauses of the Triple Alliance treaty. This, instead of three separate instruments, seems to have consisted since December, 1912, of a single treaty with a special Austro-Italian annex in regard to Albania.

"Clause III.—In case one or two of the high contracting parties, without direct provocation on their part, should be attacked by one or more great powers not signatory of the present treaty and should become involved in a war with them, the *casus fœderis* would arise simultaneously for all the high contracting parties.

"Clause IV.—In case a great power not signatory of the present treaty should threaten the state of security of one of the high contracting parties and in case the threatened party should thereby be compelled to declare war against the great power, the two other contracting parties engage themselves to maintain benevolent neutrality toward their ally. Each of them reserves its right in this case to take part in the war if it thinks fit in order to make common cause with its ally.

"Clause VII.—Austria-Hungary and Italy, who have solely in view the maintenance, as far as possible, of the territorial status quo in the east, engage themselves to use their influence to prevent all territorial changes which might be disadvantageous to the one or the other of the powers signatory of the present treaty. To this end they will give reciprocally all

information calculated to enlighten each other concerning their own intentions and those of other powers. Should, however, the case arise that in the course of events the maintenance of the status quo in the territory of the Balkans or of the Ottoman coasts and islands in the Adriatic or Ægean Sea becomes impossible, and that either, in consequence of the action of a third power or for any other reason, Austria or Italy should be obliged to change the status quo for their part by a temporary or permanent occupation, such occupation would only take place after previous agreement between the two powers, which would have to be based upon the principle of a reciprocal compensation for all territorial or other advantages that either of them might acquire over and above the existing status quo, and would have to satisfy the interest and rightful claims of both parties."—*N. Y. Times*, 6/2.

Italy, in a note of justification delivered on May 25 to the neutral powers, further revealed the contents of Article I of the treaty, as follows:

Article I of the treaty embodied the usual and necessary obligation of such pacts—the pledge to exchange views upon any fact and economic questions of a general nature that might arise pursuant to its terms. None of the contracting parties had the right to undertake, without a previous agreement, any step the consequence of which might impose a duty upon the other signatories arising out of the Alliance, or which would in any way whatsoever encroach upon their vital interests. This article was violated by Austria-Hungary when she sent to Serbia her note dated July 23, 1914, an action without the previous assent of Italy.—*N. Y. Times*, 5/26.

FATE OF ALBANIA

ROME, via PARIS, July 1.

The hoisting of the Montenegrin flag over the fortress of Scutari, Albania, is causing a greater feeling of discontent in the Italian capital than did the seizure of the Albanian towns of Tirana and Elbassan by Serbian forces.

The Italian Government is understood to have protested to both Serbia and Montenegro against the occupation of Albanian territory by their troops. Italy also has brought the matter officially to the attention of the governments of Great Britain, France and Russia, which, with Italy, at the London conference of 1912 constituted Albania as an independent state and which also reached an agreement after the outbreak of the present war to settle definitely the Albanian question at the next peace conference. —*N. Y. Herald*, 7/1.

LONDON, Friday, July 9.

A dispatch to Reuter's Telegram Company from its Cettinje correspondent states that the government has officially announced that it will submit Albania's future to a decision of the powers.

GREECE AND THE BALKANS

RESULTS OF GREEK ELECTION

LONDON, July 5.

The Greek Cabinet, under Premier Gounaris, is apparently ready to defy popular opinion as expressed in the recent election, the returns of which made it evident that a vast majority of the nation is in favor of intervention on the side of the Allies.

The Athens correspondent of the *Daily Telegraph* sends a dispatch to-night that the Cabinet has announced that it has no intention of resigning, although the Venizelos party won the election with a clear majority of 180 in the Chamber of Deputies. Instead the government is making every endeavor to win over the Venizelos Deputies.

The Gounaris Ministry, which is avowedly against any participation by Greece in the war, has the backing of King Constantine and the Queen, sister of the Kaiser. Against the ministry is Eleutherios Venizelos, the Cretan lawyer, the most popular man in Greece, who resigned the premiership because of a clash with King Constantine. He is openly for intervention in order that Greece may co-operate in the settlement of the Turkish situation when the war is ended.

The convocation of the chamber has been postponed from June to the first week of July and later to August 16.—*N. Y. Sun*, 7/6.

ENTENTE OFFERS TO BULGARIA.—The Bulgarian reply of June 21 to the note sent by the Entente Powers on May 29 was a non-committal request for further information.

LONDON, June 29.

An interesting indication of the negotiations of the Quadruple Entente with Bulgaria is given in an evidently inspired article published in the German press. No official confirmation of the accuracy of this German statement is given here. On condition that she immediately mobilize her army against Turkey, Bulgaria, it is declared, received the promise of Serbian Macedonia, the harbor of Kavalla with the hinterland of Thrace down to the line of Enos-Midia, and financial support for the purpose of carrying on the campaign. Besides this the Quadruple Entente pledged itself to broach to the Rumanian Government the question of the cession of Dobrudja.

At first it was not clear, says the German report, whether the offer of Serbian Macedonia included the whole of Macedonia or only the undisputed zone, which Serbia in 1912 agreed should in any event fall to Bulgaria, but which, as a matter of fact, she kept for herself after the second Balkan war. After ascertaining that the undisputed zone was meant, the Bulgarian Government drew up its answer, which is said to have consisted of the following series of questions:

1. What compensation has been promised to Serbia in return for the cession of the part of Macedonia offered to Bulgaria?
2. How far does the Quadruple Entente believe itself to be in a position seriously to make Bulgaria an offer in Serbian Macedonia?
3. What parts of Dobrudja is it intended to cede to Bulgaria by process of negotiation with Rumania?
4. What compensation is promised Greece in Asia Minor in the event of the cession of Kavalla to Bulgaria?
5. What is to be understood by the phrase hinterland of Kavalla?

The Bulgarian Government adds, says the German press, that it is forced to make these inquiries and obtain absolutely definite guarantees, because Bulgaria was exhausted by the wars of 1912 and 1913, and intervention in the present war would mean a great strain on the country.

The majority of the German papers unite in considering the Bulgarian answer to be a snub to the Entente Powers. On the other hand, it is to be noted that the Italian dispatches still speak hopefully of Bulgarian intervention.—*N. Y. Times*, 6/29.

TIME LIMIT TO RUMANIA

(Dispatch to the *London Morning Post*)

BUCHAREST, July 12.

The Austro-Hungarian minister here, on Wednesday last, presented to the Prime Minister proposals offering Rumania certain concessions in exchange for definite neutrality and facilities for supplying Turkey with munitions of war.

She offers to cede to Rumania a part of Bukowina as far north as Sereth, and at the same time ameliorate the treatment of Rumanians in the monarchy, granting a university to Brashow, large admission of Rumanians in Hungary into the public service, and greater liberty of administration to the Rumanian churches.

An alternative proposal affects the entry of Rumania into the field of action on the side of the Germanic Powers.

A significant point is that there is fixed the term of one month within which either alternative arrangement must be agreed to. This is the time the Germans hope the Turks will be able to hold out the Dardanelles.

The proposals are being considered by the King and Prime Minister. In political circles they are regarded as a maneuver designed to delay diplomatic action by Rumania.—*N. Y. Times*, 7/13.

NEW BALKAN LEAGUE.—Much interest is attached to the reported meeting of representatives of the Balkan States at Athens early in July. This may mean a renewal of the Balkan alliance under the leadership of M. Venizelos, of Greece.

IRRESOLUTE NEUTRALS

(Extracts from article by E. J. Dillon in July *Contemporary Review*)

Bulgaria.—An eminent Bulgarian statesman put it to me: "We have much more to gain by the victory of the Germans and Austrians, who would make short work of Serbia and Greece and enrich us with the spoils, than by the success of the Allies, who are pledged to create a great Serbia and to contribute to the expansion of the Hellenic Kingdom. The principle of nationality laid down by the Allies condemns Bulgaria to vegetate within the narrowest geographical limits for all time." In this complaint there is truth, and in the policy complained of justice. The Bulgarian race is not numerous, and with the possible exception of Macedonia, it has no "unredeemed" territory. That is its misfortune. But to seek to remedy it by seizing and assimilating Serbs, Greeks, or Rumanians, would be a crime which in regenerate Europe is not likely to be tolerated.

Bulgaria's misfortune is that she is really ruled by an Austro-Hungarian officer, whose personal vanity has been stung to the quick by the action of the Powers, condemning to the theatrical old-clothes shop the Byzantine robes and paraphernalia which he was to have worn at Aya Sofia after his triumphal entry on a tame horse into Constantinople. One cannot severely blame Ferdinand of Coburg for his affection towards the land of his birth and youth, but it behoves diplomatists to bear in mind that for his part he would as lief trust his royal life to an average cavalry horse as favor any arrangement which would bring Bulgaria into the field against Austria-Hungary.

The notions that because Bulgaria has a democratic constitution it is of little consequence who sits on the throne, and that war and peace no longer depend on the will of sovereigns, have been thoroughly exploded. It is hardly too much to say that if a Russian, Serbian, or Montenegrin prince were reigning at Sofia in lieu of Ferdinand of Coburg, Bulgaria would long ago have resumed her place among the Balkan States, Turkey would never have dared to declare war, or if she had the Dardanelles would have been forced, Constantinople captured, and tens of thousands of valuable lives would have been spared.

Rumania.—As Bulgaria's attitude is influenced by the course of the operations against the Dardanelles, so Rumania's conduct has been regulated to some extent by military events in the Carpathians. With a powerful Russian army occupying Bukovina, the Rumanian invading forces would have, so to say, a right wing formed and ready to advance or support them. But since the Russian reverses in that province, and still more since the recent capture of Przemysl by the Austrians and Germans, Rumania, like a naked boy on the river's bank who stands shuddering at the thought of the coldness of the water, is afraid to take the plunge. And this is precisely the moral effect which was aimed at in Vienna and Berlin. It reinforces the work of corruption and intrigue which is being carried on by the agents of the two empires at Bucharest.

John Bratiano, the chief of the cabinet, is now virtually dictator of Rumania. Descended from an illustrious stock, he is penetrated with an overmastering sense of his own personal responsibility, from which the principal relief to be obtained lies in the indefinite prolongation of his liberty of choice. Finality in matters of momentous decision appears painful to him, and the standard of success which would fairly be applied to the policy of the ordinary statesman seems too lax for the man whose shoulders are pressed down with the weight of the kingdom as it is and the kingdom yet to come. Hence his anxiety to drive a brilliant bargain with the Allies and to leave no hold for hostile criticism at home. Like most patriots placed in responsible positions, he is bent on furthering what he considers the interests of his country in his own way, and, honestly convinced that the right way is his own, he has hitherto declined to share responsibility with the Opposition—which disapproves his Fabian policy—even though it numbers among its members a real statesman of the caliber and repute of Take Jonescu.

JAPAN AND CHINA

TREATY SIGNED MAY 25

PEKING, May 25.

Two treaties between China and Japan, together with thirteen notes, were signed this afternoon at 3 o'clock in the Chinese Foreign Office. This act brought to a conclusion the negotiations which had been going on since last January, when Japan, shortly after the fall of the German position of Kiao-Chau, presented her demands to China.

The only difference between the terms of the ultimatum sent by Japan to China and the treaties signed to-day is the substitution of one for another mining right in South Manchuria.—*N. Y. Times*, 5/25.

U. S. NOTE TO CHINA AND JAPAN

PEKING, June 28.

Warning that the United States would not recognize any agreement between China and Japan which impaired American rights in China or endangered the so-called "open door" policy was conveyed to the Governments of both China and Japan in an identical note from Washington which was delivered about May 15. The notes were handed to the foreign offices of both countries a week after China had acceded to the demands contained in the Japanese ultimatum, insisting upon concessions from the former nation.

The United States note was, in substance, as follows:

"In view of the negotiations which now are pending between the Government of China and the Government of Japan, and of the agreements which have been reached as a result thereof, the Government of the United States has the honor to notify the Government of the Chinese Republic that it cannot recognize any agreement or undertaking which has been entered into, or which may be entered into, between the Governments of China and Japan impairing the treaty rights of the United States and its citizens in China, the political or territorial integrity of the Republic of China or the international policy relative to China commonly known as the open door policy. An identical note has been transmitted to the Japanese Government."

WASHINGTON, June 28.

The American note to China and Japan, sent early in May, was described by officials here as a caveat intended merely to conserve the rights of Americans in any future litigation. It was referred to as a legal precaution, and officials here wished it to be taken into consideration in the phrasing of any treaties or agreements which China and Japan might make as a result of the recent negotiations.—*N. Y. Times*, 6/29.

NAVAL NOTES

Naval developments in the following strategic areas will be considered separately and in turn:

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2. MEDITERRANEAN AND BLACK SEAS	1372
3. THE PACIFIC AND ATLANTIC	1384
4. THE FAR EAST	1384

BELLIGERENTS' WAR LOSSES

(On the left margin of this table of losses is a page reference to the Naval Institute War Notes.)

LOSSES OF BRITAIN AND HER ALLIES.

BRITISH WARSHIP LOSSES

PAGE	NAME	CLASS	TONNAGE	HOW LOST	DATE
45, 653, 1874..	Audacious	dreadnought	25,000..	By mine	27-10-14
247..	Bulwark	battleship	15,000..	Internal explosion	26-11-14
644..	Formidable	battleship	15,000..	Torpedoed	1- 1-15
658..	Irresistible	battleship	15,000..	By mine	18- 3-15
	Majestic	battleship	14,900..	Torpedoed	27- 5-15
658..	Ocean	battleship	12,950..	By mine	18- 3-15
	Goliath	battleship	12,950..	Torpedoed	12- 5-15
	Triumph	battleship	12,800..	Torpedoed	26- 5-15
271, 1886..	Monmouth	armored cruiser	9,800..	By gun fire	1-11-14
271, 1886..	Good Hope	armored cruiser	14,100..	By gun fire	1-11-14
1863..	Aboukir	armored cruiser	12,000..	By Submarine U-9	22- 9-14
1863..	Hogue	armored cruiser	12,000..	By Submarine U-9	22- 9-14
1863..	Cressy	armored cruiser	12,000..	By Submarine U-9	22- 9-14
1583..	Warrior	protected cruiser	13,550..	By mine	
249..	Hermes	protected cruiser	5,600..	Torpedoed	31-10-14
253..	Pathfinder	light cruiser	3,000..	By Submarine U-21	5- 9-14
1583..	Pegasus	light cruiser	2,135..	By gun fire	20- 9-14
1567..	Amphion	scout cruiser	3,500..	By mine	6- 8-14
1867..	Hawke	unarmored cruiser	7,350..	By submarine U-9	15-10-14
	Erne	destroyer	550..	Wrecked	2-15
1004..	Maori	destroyer	1,035..	By mine	7- 5-15
1007..	Recruit	destroyer	385..	Torpedoed	11- 5-15
1583..	Speedy	gunboat	810..	By mine	3- 9-14
	No. 10	torpedoboat	215..	Torpedoed	10- 6-15
	No. 12	torpedoboat	215..	Torpedoed	10- 6-15
247, 1873..	D-5	submarine	550..	By mine	3-11-14
1871..	E-3	submarine	725..	By mine	18-10-14
	A-E-1	submarine	725..	Foundered in Australia	14- 9-14
1018..	E-15	submarine	725..	Torpedoed to avoid capture	18- 4-15
	D-2	submarine	600..	Missing	
	E-17	submarine	725..	Missing	
	E-10	submarine	725..	Missing	
	A-E-2	submarine	725..	Sunk by enemy	30- 4-15
	Fishguard II	training ship	——	Foundered in North Sea	18- 9-14
230, 1873..	Niger	torpedo gunboat	810..	Sunk by submarine	11-11-14
1874..	Oceanic	troop ship	7,333..	Accidentally rammed	8- 9-14
	Princess Irene	auxiliary cruiser	5,934..	Blown up	27- 5-15
	Clan McNaughton	armed merchantman	3,103..	Wrecked	2-15
	Rohilla	armed merchantman	4,240..	By mine	30-10-14
649..	Viknor	armed merchantman	2,960..	Wrecked	14- 1-15
1005..	Bayano	auxiliary cruiser	3,500..	Torpedoed	11- 3-15

FRENCH WARSHIP LOSSES

658..	Bouvet	battleship	——	By mine	18- 3-15
1012..	Leon Gambetta	armored cruiser	12,000..	By submarine	27- 4-15
656..	Dague	destroyer	720..	By mine	24- 2-15
666..	Mousquet	torpedoboat destroyer	298..	Gun fire by Emden	28-10-14
	No. 347	torpedoboat	98..	Sunk in collision	9-10-14
	No. 338	torpedoboat	97..	Sunk in collision	9-10-14
647..	No. 219	torpedoboat	——		1-15
	Zelée	gunboat	680..	By gun fire	28-10-14
655..	Curie	submarine	398	Destroyed	12-14
655..	Saphir	submarine	390..	Wrecked	17- 1-15
	Casabianca	minelayer	495..	Mined	4- 6-15

RUSSIAN WARSHIP LOSSES

PAGE	NAME	CLASS	TONNAGE	HOW LOST	DATE
267, 666	Jemtchug	cruiser	3,050	Torpedoed by Emden	28-10-14
	Pallada	cruiser	7,775	By German submarine	11-10-14
	Putschino	torpedoboat		By gun fire	30-10-14
	Prut	armed merchantman.	5,500	By gun fire	29-10-14
	Donetz	gunboat	1,200	By gun fire	29-10-14
	Yenissei	transport	——	Sunk by submarine	6- 6-15

JAPANESE WARSHIP LOSSES

1878	Takachiho	old armored cruiser	3,700	By mine	17-10-14
	Shirotaji	torpedoboat destroyer	380	Wrecked	4- 9-14
	Name unknown.	torpedoboat	——	By mine	
	33	torpedoboat	——	By mine while dredging	11-11-14

ITALIAN WARSHIP LOSSES

	Amalfi	armored cruiser	9,958	Torpedoed	7- 7-15
	Giuseppe Garibaldi	armored cruiser	7,234	By Austrian submarine	18- 7-15
	Turbine	destroyer	330	Scuttled	24- 5-15
	Medusa	submarine	300	Torpedoed	17- 6-15

LOSSES OF GERMANY AND HER ALLIES

GERMAN WARSHIP LOSSES

632	Blücher	armored cruiser	15,500	By gun fire	24- 1-15
	Pommern(?)	battleship	——	By British submarine	2- 7-15
276, 673	Gneisenau	armored cruiser	11,600	By gun fire	8-12-14
276, 673	Scharnhorst	armored cruiser	11,600	By gun fire	8-12-14
247	Yorck	armored cruiser	9,050	By mine	3-11-14
258	Friedrich Karl	armored cruiser	8,858	By mine in Baltic	12-14
	Karlsruhe	unarmored cruiser	4,900	Blown up	11-14
1566	Augsburg	protected cruiser	4,280	By gun fire	
1566	Magdeburg	protected cruiser	4,478	By gun fire	27- 8-14
1569, 1856	Mainz	protected cruiser	4,280	By gun fire	28- 8-14
1569, 1856	Koeln	protected cruiser	4,280	By gun fire	28- 8-14
1569, 1856	Ariadne	protected cruiser	2,660	By gun fire	28- 8-14
270, 670	Koenigsberg	protected cruiser	3,550	By gun fire	3-12-14
262, 666, 1880	Emden	third class cruiser	3,544	By gun fire	9-11-14
276, 673	Leipzig	light cruiser	3,250	By gun fire	8-12-14
276, 673	Nürnberg	light cruiser	3,450	By gun fire	8-12-14
	Dresden	light cruiser	3,544	By gun fire	14- 3-15
1871, 1861	Hela	small cruiser	2,040	By submarine	13- 9-14
	Kormoran	small cruiser	1,630	By gun fire, China	6-11-14
283	Geier	small cruiser	1,630	Interned in Honolulu	8-11-14
1584	Cap Trafalgar	auxiliary cruiser	9,854	By gun fire	14- 9-14
1578	Kaiser Wilhelm der Grosse	auxiliary cruiser	5,521	By gun fire	27- 8-14
	Prinz Eitel Friedrich	converted cruiser	8,865	Interned in Norfolk	7- 4-15
	Kronprinz Wilhelm	converted cruiser	14,705	Interned in Norfolk	29- 4-15
252	Berlin	converted cruiser	17,324	Interned in Norway	11-14
	Patagonia	converted cruiser	——	Seized by Argentina—violation of neutrality	
	Eber	converted cruiser	1,000	Interned	9-14
282	Cormorant	converted cruiser	6,000	Interned at Guam	15-12-14
	V-186	destroyer	750	By gun fire	
1860	V-187	destroyer	650	By gun fire	28- 8-14
	S-106	destroyer	675	By gun fire	
1878	S-90	destroyer	400	Ran ashore and destroyed	20-10-14
1869	S-115	destroyer	420	By gun fire	17-10-14
1869	S-117	destroyer	420	By gun fire	17-10-14
1869	S-118	destroyer	420	By gun fire	17-10-14
1869	S-119	destroyer	420	By gun fire	17-10-14
1861	S-126	destroyer	487	Torpedoed	6-10-14
250	S-124	destroyer	350	Accidentally rammed by Danish steamer	23-11-14
	Taku	destroyer	280	Sunk at Tsing-tao	6-11-14
270	Iltis	river gunboat	900	By gun fire, China	6-11-14
270	Luchs	river gunboat	900	By gun fire, China	6-11-14
270	Tiger	river gunboat	900	By gun fire, China	6-11-14
270	Jaguar	river gunboat	900	By gun fire, China	6-11-14
	Hedwig von Wissmann	gunboat	200	Captured	20- 8-14
	Tsing-tau	gunboat	168	Interned	17- 8-14

PAGE	NAME	CLASS	TONNAGE	HOW LOST	DATE
	Vaterland	gunboat	168	Interned	17- 8-14
250	U-18	submarine	750	Rammed by patrol boat	23-11-14
648	U-3	submarine	——	Rammed	9- 8-14
648	U-15	submarine	250	Rammed	9- 8-14
1009	U-29	submarine	800	Lost with all hands	3-15
	U-8	submarine	250	Rammed	4- 3-15
	U-12	submarine	250	Rammed	10- 3-15
	U-14	submarine	300	Sunk	16- 6-15
	A-2	torpedoboat	150	Gun fire	1- 5-15
	A-6	torpedoboat	150	Gun fire	1- 5-15
1566	Koenigin Luise	minelayer	948	By gun fire	5- 8-14
	Markomannia	supply ship for Emden	2,840	Captured	10-14
	Navarra	auxiliary cruiser	3,641	By gun fire	11-14
	Macedonia	supply ship	4,347	Captured	4-15
	Exford	collier to Emden	——	Captured	
	Moewe	survey ship	650	By gun fire	9- 8-14
1885	Komet	old destroyer	——	Captured	
	Planet	survey ship	650	By gun fire	
	Locksun	naval tender	1,020	Interned in Honolulu	8-11-14
	Karnac	auxiliary transport	4,437	Interned in Chile	11-14
	Ophelia	hospital ship	1,153	Captured	17-10-14
	Albatross	minelayer	——	Run ashore	2- 6-15
	Bethania	armed merchantman.	4,848	Captured	9-14
	Spreewald	armed merchantman.	2,414	Captured	12- 9-14
	Graecia	armed merchantman.	1,697	Captured	10-14
	Itolo	armed merchantman.	165	Gun fire	9-14
	Rhios	armed merchantman.	150	Gun fire	9-14
	Soden	armed merchantman.	150	Gun fire	9-14

AUSTRIAN WARSHIP LOSSES

270	Kais'n Elizabeth	protected cruiser	4,000	Sunk	6-11-14
	Beethoven	converted cruiser for training	——	By mine	
1574	Zenta	light cruiser	2,300	By gun fire from French ship	16- 8-14
	No. 19	torpedoboat	78	Sunk by mine	17- 8-14
	Name unknown.	torpedoboat	——	Sunk by mine in Adriatic	
	Name unknown.	torpedoboat	——	Sunk by mine in Adriatic	
	Name unknown.	submarine	——	By gun fire from French cruiser	
	Temes	gunboat	440	Mined	23-10-14
	U-11	submarine	860	Sunk by aeroplane	1- 7-15

TURKISH WARSHIP LOSSES

260	Messudiyeh	battleship	10,000	Sunk by British submarine	13-12-14
	Medjidieh	armored cruiser	3,300	Mined	3- 4-15
	Three transports with troops		——	Sunk by Russian warships	
	Berk-i-Satvet	gunboat	725	By mine near Dardanelles	29- 4-15
	Burak Reis	gunboat	500	Scuttled	14-10-14
	Issa Reis	gunboat	420	Mined	12-14
1019	Demir Hissar	torpedoboat	97	Driven ashore	17- 4-15
	Pelenk-i-Deria	gunboat	775	Torpedoed	23- 5-15

TOTAL OF LOSSES

The *Naval and Military Record* of June 2 gives the total allied losses as 62 units of over 250,000 tons and the enemy losses as over 80 units of more than 200,000 tons. The tonnage of the allied losses has since been greatly increased by the loss of the *Triumph* and *Majestic*.

BRITISH NAVAL CASUALTIES.—Mr. Asquith, replying to a question on June 15, said: "The casualties among officers and men of the Royal Navy, Royal Marines, and Royal Naval Division to May 31 are as follows, those resulting from the loss of the *Bulwark* and other accidents being included: Killed, 549 officers and 7696 of other ranks. Wounded 181 officers and 2262 of other ranks. Missing, 74 officers and 2785 of other ranks. Totals: 804 officers and 12,743 of other ranks, making altogether 13,547."—*Army and Navy Gazette*, 6/19.

NORTH AND BALTIC SEAS

BRITISH SHIPS IN HOME WATERS

12 super-dreadnought battleships.
(3 were due for completion this year and are probably now in commission.)
11 dreadnought battleships.
7 dreadnought battle cruisers.
37 pre-dreadnought battleships.
27 armored cruisers.
22 light cruisers.
41 protected cruisers.
198 destroyers.
89 torpedo-boats.
70 submarines.
7 mine layers.
3 repair ships.

GERMAN SHIPS IN HOME WATERS

16 dreadnoughts.
4 battle cruisers.
24 pre-dreadnoughts.
9 armored cruisers.
30 light cruisers.
151 destroyers.
43 torpedo-boats.
38 submarines.

RUSSIAN SHIPS IN BALTIC WATERS

4 pre-dreadnought battleships.
13 armored and protected cruisers.
2 light cruisers.
80 destroyers.
24 submarines.

"OPHELIA" CONDEMNED.—The German hospital ship *Ophelia*, which was captured in the North Sea on October 18 by the destroyer *Meteor*, was on May 21 condemned by the Naval Prize Court as a lawful prize. Leave to appeal was granted conditionally. The British Government asked for the condemnation of the vessel on the ground that although ostensibly a hospital ship she was in reality being used as a scout or spy by the enemy. Dr. Pfeiffer, who was in command of the *Ophelia* when she was seized, claimed her on behalf of the German Government. It was admitted, however, that she never had on board a single shipwrecked or wounded person. The president in delivering his reserved judgment, said his conclusions were that the *Ophelia* was not constructed, adapted, or used as a ship for the special and sole purpose of aiding the sick, wounded, or shipwrecked, and that she was in fact used as a signalling ship for military purposes, and forfeited her claim to protection. He therefore condemned her as a lawful prize.—*Army and Navy Gazette*, 5/29.

DESTROYERS LOST.—It is a curious circumstance that, while in the first nine months of warfare no torpedo-boat destroyers were lost to the British Navy, at the beginning of the tenth month two vessels of this class should come to grief within a week of each other. The *Recruit* was sunk by a torpedo fired from a submarine on May 1, and the *Maori* by striking a mine off the Belgian coast on May 7. The propinquity of these two mishaps serves to remind us of the hazards to which the torpedo flotillas have been and must continue to be liable. It speaks very highly for the way in which these boats have been handled that there have not been more losses. The amount of work put in by the destroyers has been enormous. As the case of the *Badger*, and the destruction of *U 8* and *U 12* showed, they have been the chief assailants of the enemy's submarines, keeping them so much on the move as to be too busy to interfere with more than a small number of our merchantmen, while the patrol work they have carried out has been of great value. Destroyers, in fact, have proved of utility in many ways not perhaps thought of by their creators. We could do probably with four or five times as many as we now possess and still find opportunities to employ others.—*Army and Navy Gazette*, 5/15.

GERMAN SUBMARINE SUNK.—In the House of Commons on Wednesday (June 9), Mr. Balfour, whose statement was received with cheers, said:

"I have to inform the House that within the last few days a German submarine has been sunk, and of her crew six officers and 21 men have been taken prisoners.

"As this raises again the question of the treatment of German submarine prisoners, in which the House has shown considerable interest, it may be convenient if I make a short statement on the subject. As stated in the answer given by my right honorable friend, the financial secretary to the Admiralty, on April 29, there is not, and for some weeks there has not been, any substantial difference between the treatment of German submarine prisoners and that of other prisoners of war. As there seems, however, some doubt in the public mind on this subject, I desire to say on behalf of the government that arrangements are being made under which the treatment will not merely be substantially, but absolutely identical. But this, I need scarcely say, does not indicate any change of opinion as to the character of the acts in which these prisoners have been concerned. We hold not merely that these practices are in flagrant contradiction both of the letter and the spirit of the laws of war, but that they are in themselves mean, cowardly, and brutal. It must, however, be remembered that submarine attacks on defenceless vessels are very far from being the only violations of the laws of humanity of which the Germans have been guilty. The government are, therefore, of opinion that the submarine problem cannot be treated in isolation, and that the general question of personal responsibility should be reserved to the end of the war."—*Naval and Military Record*, 6/16.

BERLIN, June 17.

The Admiralty publicly announces the loss of the submarine *U 14*. Her crew was captured by the British.

The German submarines of *U 14* class were built in 1911-12. Their displacement, submerged, is 300 tons. They have a speed of thirteen knots above water and eight knots submerged. Their cruising radius is 1200 miles. They carry three tubes.—*N. Y. Times*, 5/18.

An important new emotional factor has been injected into the question by reports printed here that the destruction of the submarine *U 14* was directly due to the humane conduct of her commander. She was fired upon and sunk by an English "fishing steamer" after her commander had signaled to the fishermen that they had five minutes in which to leave their vessel.

Recalls Thordis Incident.—In this connection the *Local Anzeiger* prints a column communication from "A Highly Placed Personage," bitterly recalling that King George had given the Distinguished Service Order to the merchant captain of the steamer *Thordis* for ramming and sinking a German submarine, while the Admiralty made him a lieutenant in the Naval Reserve, "thus rewarding, justifying, and encouraging ramming and other hostile acts by merchantmen." The communication adds:

"There is not the slightest doubt that England, by this official act of the King, forfeited all further claims upon our submarines to live up to the usual rules of naval warfare in the future."—*N. Y. Times*, 5/19.

"PRINCESS IRENE" DESTROYED.—On May 27 the Secretary of the Admiralty made the following announcement:

"H. M. auxiliary ship *Princess Irene* was accidentally blown up in Sheerness Harbor this morning. So far as is yet known, only one survivor was picked up."

The steamship *Princess Irene* was one of two large steamers recently completed for the Canadian Pacific Railway Company, and intended for the Pacific Coast trade. The ill-fated steamer was built by Messrs. Denny &

Co., at the Dumbarton shipyard, and completed this year. She was of 5934 gross tonnage, was fitted with geared turbines, and had oil-fired boilers.—*Army and Navy Gazette*, 6/5.

TORPEDO-BOATS LOST.—The first British torpedo-boats to be lost during the war have been sunk by a German submarine in the North Sea. On June 10, the Secretary of the Admiralty issued the following: "His Majesty's torpedo-boats *Nos. 10* and *12*, whilst operating off the east coast, were torpedoed by an enemy submarine early this morning and sunk. The survivors, forty-one in number, have been landed." These vessels belonged to a group of 36 boats built between 1906 and 1908. Originally classed as "coastal destroyers," which name indicated their rôle, they were later reduced to the grade of first-class torpedo-boats, owing to their small size and indifferent sea-keeping qualities. *No. 10* was built by Thornycroft's and *No. 12* by Yarrow. They displaced 215 tons, had a length of 166½ feet, and were fitted with Parsons turbines of 3750 horse-power, giving a speed of 26 knots. Oil fuel was burned exclusively. An armament of two 12-pounder guns and three torpedo-tubes was carried. The lists both of lost and survivors published by the Admiralty contained no officers' names.—*Army and Navy Gazette*, 6/12.

THE "ROXBURGH" TORPEDOED.—The Secretary of the Admiralty made the following announcement on June 24: "His Majesty's ship *Roxburgh* was struck by a torpedo on Sunday, June 20, in the North Sea, but the damage sustained was not serious, and she was able to proceed under her own steam. There were no casualties."

The *Roxburgh* is an armored cruiser of 10,850 tons displacement, launched in 1904. She carries four 7.5-inch and six 6-inch guns.—*Army and Navy Gazette*, 6/26.

LONDON, July 1.

The torpedo-boat destroyer *Lightning* was damaged last night off the east coast by a mine or torpedo explosion. She is now in harbor. Fifteen members of the crew were lost.

The *Lightning* is the third of her class to be lost by the British since the war began. The others were the *Recruit*, on May 1, and the *Maori*, on May 8. The *Lightning* was a boat of 320 tons, carried 50 officers and men, and was armed with one 12-pounder and five 6-pounders. She was built in 1895.—*N. Y. Times*, 7/2.

"U 30" RAISED.—The German submarine *U 30*, which was sunk off the mouth of the Ems through an accident, has been raised and only one man of the crew, who for thirty-six hours were on the sea bottom, is dead, according to despatches to the *Telegraaf*, of Amsterdam, of July 5. The underwater boat has been towed to Emden for repairs.

BLOCKADE RESULTS.—Since the beginning of the German submarine blockade there have been 24,442 arrivals and sailings of vessels of all nationalities in and from United Kingdom ports, and during that period 82 British merchant vessels, aggregating 252,686 tons, have been lost, five having been sunk or captured by enemy cruisers, two sunk by mines, and 75 sunk by submarines. During the same period 72 fishing vessels, aggregating 12,035 tons, have been lost, six having been sunk by mines and 66 sunk or captured by enemy ships.

From the date of the beginning of the war the British losses in shipping have aggregated 543,104 tons, 145 British merchant vessels of 524,080 tons aggregate, and 118 fishing vessels aggregating 19,024 tons having been sunk or captured. Of the merchant ships 86 have been sunk by submarines, 56 sunk or captured by cruisers, and 13 sunk by mines. Of the fishing

boats 24 have been sunk by mines and 94 sunk or captured by enemy ships. —*London Times*, 6/16.

The German war zone decree went into effect on February 18. Since then the weekly losses of ships and lives from torpedoes have been as follows:

Week Ending	Vessels	Lives	Week Ending	Vessels	Lives
Feb. 25	11	9	May 20	7	13
Mar. 4	1	0	May 27	7	7
Mar. 11	7	38	June 3	36	21
Mar. 18	6	13	June 10	36	21
Mar. 25	7	2	June 17	19	19
Apr. 1	13	165	June 24	3	1
Apr. 8	8	13	July 1	9	29
Apr. 15	4	0	July 8	15	2
Apr. 22	3	10	July 15	12	13
Apr. 29	3	0	July 22	2	0
May 6	24	5			
May 13	2	1,260	Total	235	1,641

—*N. Y. Times*, 7/23.

BALTIC

NAVAL ACTIVITY.—A Reuter telegram from Petrograd on Monday stated that the following was communicated from an authorized source:

"On June 3 the look-out stations on our coast and our submarines doing scouting duties revealed enemy activity near our coast, especially at the entrance to the Gulf of Riga.

"At the same time enemy torpedo-boats preceding large vessels approached the entrance to the Gulf, but they retired when they saw our forces approaching. Shortly afterwards the enemy sent out hydroplanes, which attacked our ships. The attacks of the hydroplanes were fruitless, all their projectiles missing our ships, and our artillery drove them away.

"On June 6 the enemy repeated an attempt to approach our shore, but attacked by our submarines, fell back. At the same time our transport *Yenissei* was attacked and sunk by an enemy submarine in the Baltic Sea. Thirty-two men were saved.

"On June 6 reports from our coastguards and scouting submarines state that mines had been successfully laid on the route of the enemy, and by means of these and of submarine attacks three of the enemy's vessels had been sunk or damaged."—*Naval and Military Record*, 6/12.

In the Baltic the Germans have taken Libau, and have apparently, under cover of the fleet, endeavored to land troops in the hostile territory. Thus they may hope to make good their footing across the border. To cover these operations, some of their vessels penetrated the enemy's waters further to the north, where they have been met by the light cruisers and torpedo craft of the Russians, and have apparently suffered loss both from submarines and mines. The Russians claim a large armored ship and three vessels of a class not described, while they have themselves had a mine layer sunk, but appear to have been able to prevent the success of the German admiral's undertaking.—*Army and Navy Gazette*, 6/12.

BALTIC ENGAGEMENT OF JULY 2

PETROGRAD, July 4 (via LONDON, July 5).

A detailed story of Friday's naval action in the Baltic is given in a Russian official statement issued to-night. This communication follows:

"The Russian cruisers *Rurik*, *Makaroff*, *Bayan*, *Bogatyr*, and *Oleg* encountered the enemy at 8 o'clock in the morning between the Island of Oeland and the Courland coast. The enemy consisted of a light cruiser of the *Augsburg* class, a mine layer, and three destroyers.

"The sea was shrouded in a fog so dense that the ships frequently were swallowed up in darkness, and therefore the gunfire was inaccurate. The Russians, attempting to intercept the enemy's retreat, were attacked by the torpedo-boats, but were unharmed. In a half hour the *Augsburg*, finding the Russian fire too hot, abandoned her slower consort and fled full speed southward.

"The Albatross (the German mine layer) began to show signs of distress, and the torpedo-boats endeavored to assist her escape, throwing volumes of thick, black smoke out of their funnels and rendering the fog more dense, but at 9 o'clock the foremast of the *Albatross* was shot away, clouds of steam arose, and the doomed ship began to list to starboard.

"Hauling down her flag she made for the coast. As she was badly damaged and was entering neutral waters, the Russians ceased firing, and soon she was seen to go ashore behind the Oestgarn's lighthouse.

"The Russians cruised northward. At 10 o'clock they sighted a squadron of the enemy, including an armored cruiser of the *Roon* class, a light cruiser of the *Augsburg* class, and four destroyers. The Russians immediately joined battle and a half hour later the enemy began to retreat, while several submarines attacked the Russians unsuccessfully.

"The *Rurik* was sent at full speed after the retreating vessels, which were joined by another cruiser of the *Bremen* class. The *Rurik* soon had the satisfaction of seeing the effect of her salvos, for the enemy's fire weakened. The *Roon's* four 8-inch guns were silenced and fire broke out aboard. Obviously disliking further conflict the enemy disappeared rapidly in the fog.

"The Russians sustained trifling damage. No one was killed; fourteen men were wounded.

"Shortly afterwards the Russians were attacked by torpedoes from submarines, but were protected by Russian torpedo-boats which arrived to reinforce them. One of these torpedo-boats was damaged in driving off the submarine attack."—*N. Y. Times*, 7/5.

DANZIG BAY ENGAGEMENT.—An official communication issued by the Russian War Office says a Russian submarine with two torpedoes blew up a German warship of the *Deutschland* class July 2, which was steaming at the head of a German squadron at the entrance of Danzig Bay. One of the Russian destroyers, it is claimed, rammed a German submarine which was attempting to approach the Russian warships. The destroyer suffered slight damage in the collision.

The British Admiralty on July 8 stated that it was officially announced at Petrograd that the submarine which made a successful attack on a German warship of the *Deutschland* class of pre-dreadnoughts on July 2 in the Baltic was a British boat. This is the first announcement that British submarines were operating in the Baltic Sea. It is presumed that the British boat passed through the Cattegat from the North Sea to the Baltic Sea and then traveled eastward for 200 miles, as the Bay of Danzig, where the warship was attacked, lies in the southeastern part of that body of water The distance from an English port to Danzig is about 900 miles.—*Army and Navy Journal*, 7/10.

BERLIN, July 5 (via LONDON).

The Russian report regarding the destruction of a vessel of the *Deutschland* (battleship) class is untrue, according to a semi-official statement issued here. It also is denied that the mine layer *Albatross* lowered the German flag before running ashore on Swedish territory. The Russians are said to have fired 1500 shots at the *Albatross* of which only 25 were hits.

An eye-witness of the naval battle asserts that nearly the entire stern of one Russian warship was shot away.

Revised estimates place the number of killed on the *Albatross* at thirty and three more men believed to be dying. Thirty other wounded sailors are now doing well.—*N. Y. Times*, 7/6.

HORTON SANK "POMMERN"

LONDON, July 21.

The commander of the British submarine which sank a German warship in the Baltic on July 2 was Max Horton, according to announcement by Thomas MacNamara, Under Secretary for the Admiralty. The German battleship which was sunk is supposed to have been the *Pommern*.

Commander Horton handled a submarine which sank a German destroyer off the mouth of the Ems last October.—*N. Y. Sun*, 7/22.

In Monday's issue of the *Daily Telegraph*, Mr. Hurd, dealing with the Russian success in the Baltic, shows that Germany's pre-"dreadnought" battleship strength has been practically reduced by 10 per cent, because she had only ten vessels of much fighting value, all her other pre-"dreadnoughts" having only 9.4-inch guns of forty calibers. She has suffered for her move into the Baltic as she suffered for her move into the North Sea last January, and as Mr. Hurd shows, she cannot afford these losses, for they undermine the nation's confidence in its fleet.—*Army and Navy Gazette*, 7/10.

ADRIATIC

NAVAL STRENGTH OF AUSTRIA AND ITALY.—The Austrian Navy, by the present moment, includes four dreadnoughts of the latest type and formidable gun power, nine older battleships in various stages of obsolescence, together with a few fairly modern armored cruisers; but she has no up-to-date battle-cruisers, either on the water or on the stocks—a curious deficiency for a naval power of her strength and an ally of Germany.

Austria also possesses a squadron of five comparatively useless battleships of the oldest type, also two light cruisers and four torpedo gunboats, besides 20 torpedo-boats and some destroyers. Her navy is now in a state of transition, which places her under a heavy handicap which, however, is not peculiar to Austria, as in these fast moving times all navies are kept in a state of transition by the inventors and scientists. In addition to the above ships the Austrians have also some monitors and river gunboats, etc., on the Danube.

In respect to the naval position of Italy, that country, like Austria, is without battle-cruisers of the latest type, but she has six dreadnoughts of the most powerful class, and a second line of pre-dreadnoughts which number about 17 of all types; a group which entirely outclasses the pre-dreadnought and second line ships of the Austrian war fleet of the largest tonnage and armament. She also has from four to six ships of our second class cruiser type, whose largest guns consist of a group of twelve 6-inch weapons. These ships are of the *Marco Polo* class. Italy has, in addition to the above groups of battleships, about six new dreadnoughts on the stocks, or in the completing stage, which are of the latest design and will carry, it is believed, the heaviest guns afloat in the ships of any navy. The battleship strength of Italy, both present and prospective, far exceeds that of her neighbor and opponent. The Italian Navy also includes about 40 torpedo-boats and between 30 and 40 very efficient destroyers and 20 submarines of a good model, as well as eight light cruisers, two of quite recent date, and six older cruisers of some value, and a number of old and new gunboats for shallow water work. Altogether therefore, the Italian fleet is a large and efficient group of warships, manned by a young and excellently trained personnel. In fact, the fleet of Italy is a great acquisition to the Allied side and in every way worthy to take its place beside the navies of Great Britain, France and Russia. Its submarines, especially, will be very useful in the Adriatic.—*United Service Gazette*, 6/24.

AUSTRIAN ACCOUNT OF LOSS OF "GAMBETTA."—Austrian newspapers publish an interview with the lieutenant of the Austrian *U 5* on how he sank

the French cruiser *Leon Gambetta*, on April 28. "I noticed the enemy's ship steaming with covered lights twenty miles off Cape Leuca," said the commander. "The moon was bright, but there were some clouds. I started and approached to within 700 yards before I fired the first torpedo. This was immediately followed by a second, and both found their mark. There were two explosions, and I saw two columns of smoke rise as high as the masts. After the second torpedo I cruised round the vessel. Five minutes after being torpedoed the *Leon Gambetta* had a list of 35 degrees and sank in nine minutes. Then several lights were seen on the water. These belonged to five lifeboats the French had managed to launch. Their speed was remarkable. It was impossible to help in the rescue work without endangering my own vessel."—*Army and Navy Gasette*, 5/8.

AUSTRIAN RAID.—On May 24, the Italian Ministry of Marine says that the Austrian torpedo-boat *S 20*, having approached the canal at Porto Corsini (on the Adriatic), was so seriously damaged by fire from Italian batteries that she was forced to be convoyed to Pola. The torpedo-boat destroyer *Scharfschuetze*, which was operating with the *S 20*, also was damaged, suffering the loss of many of her crew. The Austrian scout ship *Novara* was struck several times and also had several of her crew killed, including an officer. The Austrian destroyer *Ozepel* also suffered severe losses, due to the arrival of an Italian naval squadron during the action. The report also states that during a chase the Italian torpedo-boat destroyer *Turbine*, 330 tons, built in 1901, was sunk, after catching fire. Nine men of the *Turbine* were saved by the Italian fleet, and thirty-five more were picked up by the Austrians, including the commander.—*Army and Navy Journal*, 6/5.

MONFALCONE CAPTURED.—On June 10 it was announced that the Italians had captured the Austrian town and port of Monfalcone, a shipbuilding center for smaller vessels of the Austro-Hungarian Navy. By the capture of Monfalcone, Italy has secured an important arsenal, a dockyard, in which several torpedo craft were under construction, and big stores of munitions and grain. Monfalcone had been thrice bombarded by light Italian warships on May 31, June 5, and June 7, but it was not until a strong attack from the land side, supported by a vigorous artillery fire, that the city was occupied.

Monfalcone, where are important shipbuilding yards, is on the northernmost bay of the Gulf of Trieste, and is only 15 miles northwest of the city of that name. It is about 10 miles from the Italian frontier, and is the junction of the railway which enters Italy at Cervignano and continues to Venice, and that which runs northward through Görz and along the valley of the Isonzo. It is most probable that Austrian warcraft were in course of construction at Monfalcone, though doubtless destroyed by the retreating enemy.—*Naval and Military Record*, 6/16.

ROME, June 15 (Dispatch to the *London Daily News*).

Refugees from Gradisca now at Florence say two cruisers and one transatlantic liner were under construction in the yards at Monfalcone, which fell into Italy's hands June 10. Work on these vessels was proceeding night and day, and 3600 hands were employed.

When prior to the Italian occupation, bombs were dropped by airmen on the place, the shipyards were set on fire and the workmen were seized with panic and fled. The Austrians sank lighters loaded with stones and sand in the canal, thus obstructing the entrance.—*N. Y. Times*, 6/16.

"MEDUSA" SUNK

VENICE, June 18.

Details have been received of the recent remarkable engagement on June 17, between an Italian and an Austrian submarine, in which the Italian boat was vanquished.

The Italian boat, the *Medusa*, having a displacement of 300 tons and a crew of fourteen men, was lying submerged, and the Austrian boat was not far away, also under water. Neither had any intimation of the presence of the other.

The *Medusa* came to the surface first, swept the horizon with her periscope, and finding the way clear, emerged. Shortly after the Austrian boat decided to come up. She sent up her periscope and saw the Italian not far away. Recognizing an enemy, she immediately attacked, and one shot from her torpedo was sufficient to send the *Medusa* to the bottom.

One report has it that an officer and four members of the crew of the *Medusa* escaped and were made prisoners by the Austrians.—*N. Y. Times*, 5/19.

The Austrian submarine *U 11* was bombarded and sunk in the Adriatic by a French aeroplane July 1, as officially reported by the French Minister of Marine. The *U 11* was lying on the surface and apparently failed to notice the aviator as he circled overhead. The aeroplane shot downward to within 45 feet of the submarine's deck, and two bombs were dropped, both of which struck the submarine near the turret and exploded before it could submerge. The submarine sank almost instantly. Wreckage was afterward found about the scene. The *U 11* was one of the newest of the Austrian submersibles and displaced about 860 tons. She is supposed to have had aboard a crew of 25 men. This is the second time in history that an aeroplane has sunk a submarine. The previous event was the sinking of an Italian submarine by an Austrian airman.—*Army and Navy Journal*, 7/10.

"AMALFI" LOST

ROME, July 8.

The Italian armored cruiser *Amalfi* was torpedoed and sunk at dawn yesterday morning by an Austrian submarine while taking part in a reconnoissance in the Upper Adriatic. Official announcement of the disaster is made by the Ministry of Marine. Most of the members of the crew were saved.

The text of the statement, which bears yesterday's date, follows:

"A reconnoissance in force was accomplished last night (July 6) in the Upper Adriatic. The *Amalfi*, which took part in the reconnoissance, was torpedoed at dawn this morning by an Austrian submarine and soon listed heavily to port.

"The commander, before giving orders to the crew to jump overboard, cried 'Long live the King, long live Italy!' The entire crew, drawn up along the stern, echoed the shout, giving a remarkable exhibition of courage and discipline.

"The commander, who was the last to leave, slipped overboard shortly before the *Amalfi* sank. Nearly all the officers and crew were saved."

The *Amalfi*, which was completed in 1908, had a displacement of 9958 tons and was 426 feet long. Her complement in time of peace was 684.

The cruiser, with her sister ship, the *Pisa*, was characteristically an Italian craft, having been designed by Cerlando, the inventor of the dreadnought type, the first one of which he built for England in 1904-06. A feature of the *Amalfi* was her guns. They were placed at the unusual height of 22 feet above the water; all were electrically controlled from a single base, and all had central pivot mountings.—*N. Y. Times*, 7/8.

"GARIBALDI" TORPEDOED

ROME, July 19.

An official statement issued from general headquarters to-day says:

"At dawn July 18 a division of our old armored cruisers approached Cattaro and bombarded and seriously damaged the railway near by.

"While our vessels were retiring they were attacked by enemy submarines, and the cruiser *Giuseppe Garibaldi*, after having avoided the first

attack, was struck by a torpedo and sunk. The crew remained calm, and nearly all were saved."

The *Garibaldi*, although classed as either a battleship or an armored cruiser, was in reality a gigantic gunboat on account of her small but heavy main battery and her large secondary battery of all sorts. She was an experiment designed by Orlando, the inventor of the first British dreadnought, although not built by him, as was her sister ship, the *Varese*. Another sister ship is the *Francesco Ferrucio*. All three were built with the prime idea of conducting operations against land fortifications while protecting themselves against lighter craft that might be sent against them.

The *Garibaldi* was laid down in 1898 and finished in 1901. She was 344 feet long, 59 feet beam, and her maximum draft was only 25 feet. She had a displacement of 7400 tons, and was manned by 517 officers and men. Her speed was 20 knots and she cost about $1,200,000.

Ragusa, near where the *Giuseppe Garibaldi* was sunk, is a fortified seaport of Austria-Hungary, in Dalmatia, on a peninsula of the Adriatic Sea, 38 miles northwest of Cattaro.—*N. Y. Times*, 7/20.

ADRIATIC CLOSED TO MERCHANT VESSELS

WASHINGTON, July 8.

Ambassador Thomas Nelson Page to-day notified the State Department, in a cablegram sent from Rome yesterday, that the Italian Government had closed the Adriatic Sea to navigation by merchant vessels of all countries, but that safe convoy would be furnished for ships wishing to enter ports on the Adriatic belonging to Italy or occupied by Italy or Montenegro. The report read in part:

"The Italian Government informs me that from July 6 the blockade declared by it on the 26th and 28th of last May has been extended to all the zones of the Adriatic Sea north of the line Otranto-Aspri-Ruga (Strade Blanche). Navigation in this sea north of this line is considered forbidden to all merchant vessels of all countries.

"A safe convoy will be delivered by the Ministry of War or by its agents to ships wishing to enter ports on the Adriatic Sea belonging to or occupied by Italy or Montenegro.—*N. Y. Times*, 7/8.

MEDITERRANEAN AND BLACK SEAS AND DARDANELLES

The naval powers are represented in the Mediterranean as follows:

FRANCE

4 dreadnoughts.
18 pre-dreadnoughts.
(All carry 12-inch guns.)
20 armored and protected cruisers.
11 light cruisers.
(Several of these were abroad at the opening of the war.)
84 destroyers.
153 torpedo-boats.
(Most of these are small and probably suitable only for harbor defence work.)
70 submarines.

GREAT BRITAIN

3 battle cruisers.
4 armored cruisers.
16 destroyers and depot ships.
2 gunboats.
6 submarines.
(3 at Malta; 3 at Gibraltar.)
16 torpedo-boats.

AUSTRIA-HUNGARY

3 dreadnoughts.
(Only the dreadnoughts and 3 of the pre-dreadnoughts are armed with 12-inch guns. The others carry 9.4-inch weapons.)
12 pre-dreadnoughts.
2 armored cruisers.
12 light cruisers.
(Including 3 nearing completion at the outbreak of the war.)
19 destroyers.
11 submarines.
58 torpedo-boats.
(These torpedo-boats are only 200 tons or smaller; armed for the most part with 3-pounders.)

THE RUSSIAN BLACK SEA FLEET

Warships	Tonnage	Horsepower	Guns	Torpedo Tubes
10 battleships	150,522	153,215	336	29
2 cruisers	13,350	39,000	60	4
22 destroyers	15,500	297,500	58	48
14 torpedo-boats	2,082	30,080	30	32
2 torpedo-boat transports	6,839	4,137	20	..
11 submarines	4,873	13,590	7	30
4 gunboats	5,059	5,937	11	..
7 transports	28,046	14,872	..	..
1 despatch boat	400	3,300	6	2
2 yachts	3,820	7,780	16	..
12 port vessels	13,373	7,808	22	5
87 warships	243,864	577,219	566	150

THE TURKISH FLEET

1 battle cruiser	22,640	70,000	34	4
3 battleships	29,320	31,400	94	6
1 coast defence ship	2,400	2,200	22	..
2 protected cruisers	8,220	34,300	28	4
2 torpedo gunboats	1,540	10,200	24	6
9 destroyers	3,930	4,500	56	20
15 torpedo-boats	1,990	30,000	18	8
33 warships	70,040	182,600	276	48

—*N. Y. Herald*, 3/6.

AUSTRALIAN SUBMARINE SUNK

TURKS REPORT THAT IT WAS TRYING TO APPROACH CONSTANTINOPLE

LONDON, May 11.

The Admiralty to-night issued the following statement:

"A Turkish official communication coming by way of Berlin and Amsterdam says the Australian submarine *AE 2* has been sunk by Turkish warships while trying to enter the Sea of Marmora, and that the crew of three officers and 29 men were taken prisoners.—*N. Y. Times*, 5/12.

"GOLIATH" TORPEDOED BY DESTROYER.—It was suggested in the official *communiqué* that the *Irresistible* and *Ocean* were destroyed by floating mines, and that the *Bouvet* met her fate in a similar manner. Since March 18, the menace of the floating mine seems to have been met. Then on May 12, the *Goliath*, when protecting the French flank just inside the Straits, was torpedoed by a destroyer in a night attack. There have been

no further details of this affair published from the British side. The Turks, however, have stated that the successful boat was the *Muavenet-i-Millet*, one of a quartette built by the Schichau Company, at Elbing, in 1909, a comparatively modern 35-knot vessel. Mr. Churchill, in the House of Commons, in the only official announcement made about the matter, did not explain how the *Goliath* was at the time protecting the French flank, but presumably she was there to defend the boats engaged in landing supplies, or was prepared to open fire on the enemy if they made a night attack on the trenches. The loss of the *Triumph* appears to have occurred in somewhat similar circumstances when she was protecting or supporting the left of the Dominions' contingent. The misfortune seems to have happened on May 12, and as the submarine which successfully torpedoed her was chased until dark, it was manifestly a daylight attack.—*Army and Navy Gazette*, 5/29.

H. M. S. "TRIUMPH" SUNK

LONDON, May 27.

The Secretary of the Admiralty makes the following announcement:

"While operating yesterday (May 26) in support of the Australian and New Zealand forces on shore on the Gallipoli Peninsula, H. M. S. *Triumph* (Captain Maurice Fitzmaurice, R. N.) was torpedoed by a submarine, and sank shortly afterwards.

"The majority of the officers and men are reported as saved, including the captain and commander.

"The submarine was chased by the destroyers and patrolling small craft until dark."—*Naval and Military Record*, 6/2.

"MAJESTIC" SUNK

LONDON, May 27.

The Secretary of the Admiralty makes the following announcement:

"An enemy submarine torpedoed and sank H. M. S. *Majestic* (Captain H. F. G. Talbot) this morning while supporting the army on the Gallipoli Peninsula.

"Nearly all the officers and men were saved.—*Naval and Military Record*, 6/2.

THE LOST BATTLESHIPS.—His Majesty's ship *Triumph*, which was torpedoed by an enemy submarine last week, was one of two 20-knot battleships (the other is the *Swiftsure*), which were purchased from the Chilean Government in January, 1903. Her normal displacement was 11,800 tons, and her complement 700. She had four 10-inch guns, fourteen 7.5-inch, fourteen 14-pounders, one 12-pounder, 8 cwt., four 6-pounders, and four Maxims, besides torpedo-tubes. The *Triumph* was designed by Sir E. J. Reed and built by Messrs. Vickers.

His Majesty's ship *Majestic* (Captain H. F. G. Talbot), sunk on the day after the *Triumph*, was one of nine battleships of the class named after her, all of which date from 1894-1896. At the time they were built they were the finest ships in the world, and are still most serviceable vessels. The *Majestic* was a Portsmouth ship, completed in 1895. She was of 14,900 tons displacement, carrying four 12-inch and twelve 6-inch guns, with a nominal speed of 17.9 knots.

The *Majestic* is the fifth British battleship to be lost in the Dardanelles, the others being the *Irresistible* and *Ocean*, sunk on March 18, the *Goliath*, sunk on May 13, and the *Triumph*, sunk on May 25. The French battleship *Bouvet* was also lost on March 18. The *Irresistible*, *Ocean*, and *Bouvet* were mined, or struck by a Leon torpedo, which is a kind of locomotory mine. The *Goliath* was torpedoed, apparently at night, by a Turkish torpedo-boat. The *Triumph* and *Majestic* were torpedoed by a submarine. Hostile submarines could draw supplies from Turkish ports on the Mediterranean, and the many islands of the Archipelago of Turkey in Asia

afford harborage. The naval operations in the Dardanelles must necessarily take place in waters peculiarly dangerous.—*United Service Gazette*, 6/3.

TURKISH VERSION.—The nature of the duty which necessarily falls to our ships while supporting the troops ashore is such as to expose them to torpedo attack under conditions that strongly favor the attackers. From the—for once—straightforward and lucid Turkish account of the *Triumph's* loss it appears that the ill-fated ship, accompanied by two destroyers, was moving very slowly with nets out. Light cruisers and more destroyers were near at hand. These precautions suggest that the submarine danger was clearly realized. That in spite of the attendant destroyers the enemy submarine was able to approach within range and fire her torpedo with perfect accuracy shows her to have been most ably handled.—*Naval and Military Record*, 6/2.

FRENCH MINE LAYER SUNK.—An official note issued at Paris, June 7, said: "During the night of June 3-4 the French mine layer *Casabianca* struck a mine at the entrance to the Ægean Sea. The captain, one officer, and 64 of the crew were rescued by a British destroyer. It is possible that other survivors may have succeeded in gaining the coast and are prisoners in the hands of the Turks."—*Army and Navy Gazette*, 6/12.

The *Casabianca* was a vessel of 495 tons. She was 262 feet long and had a complement of 128 men.—*N. Y. Times*, 6/8.

TURKISH CRUISER RAISED.—A despatch from Odessa June 8 reports that the Turkish armored cruiser *Medjidieh*, which was blown up by a Russian mine near Odessa in the early part of April, has been raised and brought into Odessa for repairs.—*Army and Navy Journal*, 6/19.

"BRESLAU" ATTACKED.—It was officially stated in Petrograd on June 12 that on the previous night "near the Bosporus two Russian torpedo-boat destroyers encountered the *Breslau*, whose searchlights showed up one of our turbine destroyers, which at once attacked the cruiser. A very violent exchange of shots took place, and it was observed on board our vessel that several shells struck the cruiser. Explosions were heard on board her, and a fire was noticed in her bow. Owing to the darkness, however, it was impossible to see how seriously the enemy had been damaged. On board the destroyer which attacked an officer and six men were wounded." A Reuter message from Athens on June 15 said that "according to credible information the cruiser *Breslau*, during her encounter with the Russian squadron in the Black Sea on June 11, suffered damage and the loss of 12 officers and 80 men killed. Several torpedo-boats and two colliers are said to have been sunk."—*Army and Navy Gazette*, 6/12.

RUSSIAN SUBMARINE ACTIVE

PETROGRAD, July 3.

An official statement issued by the Admiralty to-day reads:

"A Russian submarine in the Black Sea to-day torpedoed and sank a steamer of 2500 tons. It then set fire to and sank a sailing ship of 1500 tons. Subsequently a small steamer was sent to the bottom. Three vessels were in the neighborhood of Kesken and were laden with coal and provisions.

"The submarine also shelled another steamer anchored in the river, and several coal-laden barges and a tug were driven ashore.

"Near the mouth of the Bosporus the submarine came into action with an armored schooner. After an exchange of shots this vessel, with two others of a similar type were run ashore."—*N. Y. Times*, 7/4.

WORK OF BRITISH SUBMARINES.—A Turkish headquarters report received via Berlin on May 24 stated that the twenty-five-year-old Turkish gunboat *Pelenk-i-deria* was sunk on the previous afternoon by a hostile submarine. The crew, with the exception of two killed, were uninjured. The *Pelenk-i-deria*, which was built in 1890, had a tonnage of 775 and carried two 4-inch Krupp guns, six 3-pdrs., and three 14-inch tubes. This is a still further success for the Allied submarine flotilla, and the identity of the boat will be awaited with interest. The ships known to have been sunk by *E 14* are four in number: (1) A gunboat of the *Berk-i-Satvet* class (built in 1906, of 740 tons, with two 4-inch, six 6-pdrs., two machine and two other guns), on her passage to the Sea of Marmora; (2) a transport on April 29; (3) a gunboat on May 3; and (4) a very large transport full of troops on May 10. In addition, she compelled a small steamer to run herself aground on May 13. An account cabled to the *Daily Chronicle* by its correspondent, Mr. Renwick, says that *E 14* had eight torpedoes on board, and not one was wasted. The vessel ran many risks, not only from the mines which are always floating down stream in the Straits, but she had also to run the gauntlet of the land batteries and of the submerged torpedo-tubes under the rocky shores of the Straits. The Turco-German outlooks at certain of these points were aware of the submarine's presence. Her skillful commander, however, took her safely through the mine-fields, past the torpedo-tube stations, and past the batteries, several of which opened fire on her.—*Army and Navy Gazette*, 5/21.

"E 11" OFF CONSTANTINOPLE.—On May 27 the Secretary of the Admiralty issued the following statement:

"A message has been received from vice admiral, East Mediterranean, reporting that submarine *E 11* (Lieutenant Commander Martin E. Nasmith) has sunk in the Sea of Marmora a vessel containing a great quantity of ammunition, comprising charges for heavy howitzers, several gun-mountings, and a 6-inch gun. She also chased a supply ship with a heavy cargo of stores, and torpedoed her alongside the pier at Rodosto. A small store ship was also chased and run ashore. Submarine *E 11* entered Constantinople and discharged a torpedo at a transport alongside the arsenal. The torpedo was heard to explode.

A telegram from Constantinople on June 1 reports that a British submarine has torpedoed two Turkish transports, one of which was laden with troops, in the Sea of Marmora. One of the vessels was steamer *No. 62*, belonging to the Mahsussien Company. Like the other transport that was sunk, it was carrying troops to the Dardanelles.—*Army and Navy Gazette*, 6/5.

TALE OF "E 11"

LONDON, June 28.

The *Chronicle* publishes the following account, by one of the crew, of the exploit of the British submarine *E 11*, for which Lieutenant Commander Nasmith received the Victoria Cross and each of his men the distinguished service medal:

"We left Imbros one morning about 3 o'clock and steamed toward the Dardanelles and dived as day was breaking and—well, got through the Narrows O. K., arrived on the other side and saw two battleships. We were getting ready to torpedo one of 'em when they spotted us, opened fire on us, and nipped, bunked, ran away.

"We then journeyed on for a mile or two and then went to the bottom and rested until about 8 p. m., when we came up. It was dusk; so we looked around. Nothing in sight. We broke the surface and entered the Sea of Marmora and bumped around for a few days without sighting a thing until Sunday morning, when we were diving outside of Constantinople and saw a big gunboat, and at 6.25 a. m. we gave her a 'tin fish.' By 6.30 a. m. she was no more; but before she sank, while she was listing over,

they opened fire on us. The second shot hit our periscope and 'done it in.' That gunner must have been a cool card, eh?

"On Monday we sighted a steamer, came to the surface alongside her and told her to stop. She stopped, and the men were so anxious to get clear that one boat capsized. No lives were lost. There was a Yankee correspondent aboard who tried to bluff; no good, though, 'cos an officer and two men boarded her and discovered she had a 6-inch gun, several gun mountings, and 15-inch ammunition aboard. So we blew her up.

"A few minutes after we sighted another steamer and told her to stop. She wouldn't. We chased her into the harbor, and when she was securing alongside a pier we torpedoed her.

"Soon after we sighted another steamer and chased her till she ran ashore. We were about to board her when some cavalry came up and opened fire. We replied and dropped a few, and then dived and torpedoed the ship.

"Next day (Tuesday) our skipper decided on entering Constantinople. To make a long story short, we got into the harbor without mishap and fired two torpedoes, one of which sank a transport loaded with troops, and the other exploded on shore somewhere. We learned afterward that it caused some panic. The troops refused to go on another transport, the shops closed, and people ran up the hills—in fact, it caused uproar for a time.

"The following Friday morning we saw five transports escorted by destroyers. We banged the first and biggest one, which sank in about three minutes.

"A few days later we went back to our old corner, where we sank those other three and caught a supply ship napping.

"A few days after we torpedoed a German transport, and then we got no more blood for a time until last Monday morning, on our way back, just before entering the Narrows, we sank another transport. That was our farewell smack.

"When we broke surface that evening we found a mine hanging over our bows. We chucked it off as quick as possible, when our escort came up, gave us three cheers, and off we went."—*N. Y. Times*, 6/28.

GERMAN COMMANDER AT DARDANELLES.—Some interesting details in regard to the German naval commander at the Straits are given in the *Berliner Tageblatt*. According to this journal, the "Defender of the Dardanelles" is none other than the late naval aide-de-camp and favorite of the Kaiser, Admiral von Usedom, or Usedom Pasha, as he is now called. Von Usedom, who appears to have been elevated in March to the rank of an adjutant-general of the Kaiser in consequence of his "brilliant conduct of the Dardanelles defences," is one of the best known of higher German naval officers. He served on the active list from 1871 to 1910. As captain of the cruiser *Hertha* in the Far East in 1900 he led the German contingent during the march of the Allies to Pekin, under Admiral Sir Edward Seymour, and carried out the latter's celebrated command, "Germans to the front!" On his return from China the Kaiser made Usedom commander of the Imperial yacht, in which he served from 1902 to 1904, and, after subsequent service as superintendent of the Imperial dockyard at Kiel, he joined the personal suite of the War Lord, always ranking as one of his most intimate advisers on naval affairs. At the Dardanelles von Usedom is served by another German naval officer, Captain von Janson, as chief of staff. Presumably the officers of the *Goeben* and *Breslau* are also associated with Admiral Usedom Pasha, as well as a number of other naval officers who have been sent to the aid of Turkey. The Turks claim, indeed, that the *Goeben*, firing across the Peninsula, has disabled one of the cruisers in the Allied fleet.—*Army and Navy Gazette*, 5/29.

OPERATIONS AT THE DARDANELLES.—Those who were, and are, *au courant* with the geographical position and with the political and military con-

ditions prevailing in this area, have always known that a successful attack upon the Dardanelles could be best made by one of two general methods:

(1) By a surprise dash up the Straits before the permanent defences were properly organized and garrisoned, and before the whole of the European and Asiatic coasts of the Dardanelles had been turned into vast entrenched areas.

(2) By a combined land and sea attack made in such a way that a force or forces landed on one or both sides of the Straits would threaten the forts from the rear, and therefore minimize the effect of their fire directed against ships.

In the circumstances the adoption of the first of these alternatives, which might have been feasible some years ago, was impossible, because it was clear from the first that the Turks and the Germans must have made the fullest preparations to defend the Dardanelles, not only before the entry of Turkey into the war, but also between that time and the moment when the Allied naval operations began, during the latter half of the month of February. Moreover, throughout the Turco-Italian and the Balkan campaigns the strength of the forts upon the Dardanelles was greatly increased. In addition, even had it been possible for a given number of ships to dash through the Straits and to enter the Sea of Marmora, their position—once arrived there—would have been highly perilous. Practically cut off from all means of support, they would have been compelled to face and to overcome the numerous obstacles which must exist in and near that sea itself. Moreover the reinforcement or the retreat of a fleet once temporarily successful would have created problems of the greatest difficulty, even had it been possible to solve them at all. In other words, it is one thing to be able to push open a door which has not been adequately barred, and quite another to hold it or to push it in the opposite direction when it has once again been closed and properly bolted behind you.

As I have already said, we do not know whether it was at first intended to adopt perhaps a modified form of the first of these alternatives, or whether landing operations on a large scale were always part of the scheme. In the latter case, unless the existence of possible diplomatic conditions, which do not come within the scope of this article, necessitated a demonstration, it seems unfortunate that the enemy had so much time in which to improve his defences and to create conditions which have necessitated the adoption of a third and a more or less different plan from either of those discussed above. That plan is that the operations at the Dardanelles have now become, and that they constitute, a land campaign which has already developed into one of enormous magnitude. Thus, instead of landing parties threatening the rear of the forts at the same time as the fleet was endeavoring to push its way up the Straits a force destined at least to conquer the Peninsula of Gallipoli, has had to be disembarked. In a word, the all-engrossing interest in the operations has been at least temporarily transferred from the events on the sea to those on the land. Here the Allied armies have been, and are, fighting a great battle, or a series of battles, with the apparent object not only of minimizing the task of the fleet, but also of enabling that fleet to glide, rather than to fight, its way through into the Sea of Marmora.

In the case of the operations under review, the whole situation is such that it reacts almost entirely against the belligerents who depend upon the fire of the ships for the accomplishment of their object, and in favor of those in occupation of the shores. In greater detail this state of things is due to all or some of the following causes:

(1) The Dardanelles are so narrow that throughout their greater part the power of real maneuvering is denied to all ships except those of a very small size. Whilst the length of the Straits is some thirty-three miles, their breadth varies from about four miles at the widest point, situated as it is only just inside the entrance, to about 1300 yards measured between

Kilid Bahr, on the Peninsula of Gallipoli, and Chanak on the Asiatic coast. The average width may be said to be about two or three miles, but throughout the reach, which extends from Kephez Point to Nagara Point, places separated by about five and a half miles, the breadth of the channel is nowhere more than about three miles, and this only in one spot, situated just above the former place. Consequently, as all the forts of the most predominating importance defend this winding part of the Straits, in which the current is so rapid, it is clear that big ships can hardly do otherwise than remain practically stationary or else steam more or less straight ahead, along the only course which is open to them.

(2) For the same reasons, that is, owing to the narrowness and to the winding nature of the channel, the great guns of ships, the range of which is many miles, cannot be utilized to the fullest advantage. In other words, they cannot come into action with direct fire until the ships themselves are within the range of shore guns, even though that range is far less than that of the ships' big guns.

(3) The Turks, owing to the narrowness of the channel, can make use of all kinds of weapons which would be valueless were the range greater. This means that they can develop the fire of guns which do not form part of the regular defences of the Straits. Mobile batteries of guns and howitzers can be placed in the countless and secluded valleys in which it is difficult to discover their positions, and to rain lead upon them from the sea. Again, these positions once revealed, the guns in question can or could be moved to some other locality from which their fire is equally effective. The existence of these conditions may not involve serious perils for large and armored ships, and for their crews who are protected by that armor, but they have extremely detrimental and dangerous consequences for small vessels and their crews—vessels which must be utilized for the purpose of reconnaissance work, and for the mine sweeping which repeatedly has to be carried out.

(4) The Dardanelles channel is a locality in which mines can be used to the greatest advantage. The whole area can be rendered impassable by means of "contact" mines, by the use of "observation" mines, or by the launching of "floating" mines. Whilst the uneven and rapidly flowing current creates certain difficulties in the case of "contact" mines, the narrowness of the channel greatly minimizes those which always accompany the use of the complicated machinery necessary to explode "observation" mines from the shore. Moreover, as we already know, the ever-recurring danger of "floating" mines, drifted down by the current from the Sea of Marmora or elsewhere, is one against which it is, and must be continually, necessary to guard.

(5) The narrowness of the Dardanelles renders it a particularly favorable area for the employment of torpedoes fired or launched from the shore. These weapons of war can either be sent on their way from proper torpedo-tubes or by other methods of a more impromptu nature.

Having thus described the extremely unfavorable position of a fleet desirous of entering the Sea of Marmora, I will now allude to some of the reasons why the task of such a fleet can be greatly furthered by a force or forces landed on one or both sides of the Dardanelles. To begin with, although the Turks have had plenty of time to prepare a perfect network of defences, and to turn the areas which earlier might have been stormed with comparatively small losses into veritable forts, the actual distances to be traversed by a force disembarked on the Asiatic side, and particularly on the Peninsula of Gallipoli, are comparatively small. This Peninsula, which may be described as a long, narrow tongue of land, nowhere measures more than about twelve miles in width, and this only in one particular and small part, which is situated just above the Narrows. Its breadth, at the extreme northeastern end and along the Lines of Bulair, is only three miles. Further to the southwest, and measured along a line extending from Maidos to Gaba Tepe, the breadth is only about five miles. This means

that the whole land attack can be covered, and the ground more or less prepared for the infantry advance, by the guns of the fleet.

The special and unique positions of the forts on both shores of the Dardanelles also render their attack from the land side or sides a particularly desirable, or more correctly, an absolutely necessary undertaking. Thus, whilst numerous batteries have no doubt now been placed in favorable positions, and whilst the backs of the forts have probably been protected by earthworks, the greater number of the defences situated on the European as well as upon the Asiatic coast are actually commanded from the hills located in rear of Maidos and of Kilid Bahr. Indeed, from various points on these hills it is possible, so to speak, to look down upon, if not actually into, many of the eleven European redoubts of which we have heard so much during the last few weeks. Moreover, the great and heavy guns of these forts are so arranged, and must be so arranged, that they can only be directed towards the sea and not towards the hills which overshadow them.

True it is that there still remains the defences of the Asiatic coast, which are in themselves of the utmost importance, not only in relation to the sea, but also because their guns can probably throw huge missiles on to, and right across the Peninsula of Gallipoli. To threaten these Asiatic forts from the rear would in some ways be a much more difficult undertaking than to occupy the Gallipoli hills. They cannot be dominated in the same way as can those upon the European side, and, in addition, the distance to be traversed by a landing force, instead of being only at most five, would be about twenty miles. But as the Asiatic coast is much lower than the European, it is clear that an army once occupying the hills which I have described above will be able not only to silence and finally to occupy the Kilid Bahr forts, but also to make its influence most unpleasantly felt in the defences which respectively lie to the north and to the south of the town of Chanak.

The difficulties would have been great enough had it only been necessary to land small parties of infantry. But as a large expeditionary force, composed of all arms, and especially strong in heavy artillery, is obviously required to undertake what is practically a siege, the absence of any proper and sheltered base creates a most complicated naval and military problem. The weight of modern munitions is incredible, the consumption is terrific. The weather at the Dardanelles is always treacherous and uncertain. Thus whilst one expects it to be fine and warm from the beginning of May, even in summer there are sometimes awful winds lasting occasionally for three or even five days. These winds, and especially those all-important ones which blow from the south, get up very quickly, and affect not only the surface, but also the height of the usually tideless waters. This weather factor, when coupled with others which have to be taken into consideration, must make the construction and the maintenance of adequate piers upon an open and unsheltered coast extremely difficult. In a word, the future alone will prove the justification or want of justification of the formerly accepted principle that a well-protected harbor is a necessary possession to an army which has to draw its supplies and ammunition from across the sea.

From whatever direction or in whatever area they may be undertaken, it is impossible to exaggerate the local difficulties which must be overcome in accomplishing the task allotted to the Allied armies upon the Peninsula of Gallipoli. As a traveler who has ridden and tramped across the rough districts of Albania, and of Asia Minor, I can say as a result of my personal experience, that it is by far the worst area of land upon which I have ever set foot. Almost the whole district, and especially that part which borders upon the Straits between the Lines of Bulair and Eski Hissarlik, is covered by hills which in places rise to a height of nearly 1000 feet above the level of the sea. On the extreme southwest there is Atchi-Baba, and to the northeast of Kilid Bahr and Maidos there are Saribair and Khoja Chemen Dagh, the latter attaining an elevation of 950 feet. These positions must be occupied before an advance can be made to the shores of the Narrows.

The hills or mountains run not in any regular or well-defined direction, but they consist of a group or of a series of groups of peaks. Through and between these hills there run an equally confusing number of valleys—valleys which for the most part stretch across rather than up and down the Peninsula.

The whole area is practically roadless, and much of it is covered by prickly scrub—bushes so thick and terrible that they tear and damage one's person from head to toe. The slopes of these hills and the sides of these valleys, if indeed they can be called slopes at all, are so almost perpendicular that at times it is necessary to scale them on hands and knees. Every hill and knoll must be seized from, and defended against, a brave and determined enemy, whose cause is entirely favored by the nature of the area in which his troops and his snipers are located.—H. CHARLES WOOD, *Fortnightly Review*, June.

THE LANDING AT V BEACH, DARDANELLES

(From Sir Ian Hamilton's Despatch of May 20)

The landing on V beach was planned to take place on the following lines:

As soon as the enemy's defences had been heavily bombarded by the fleet, three companies of the Dublin Fusiliers were to be towed ashore. They were to be closely followed by the collier *River Clyde* (Commander Unwin, R. N.) carrying between decks the balance of the Dublin Fusiliers, the Munster Fusiliers, half a battalion of the Hampshire Regiment, the West Riding Field Company, and other details.

The *River Clyde* had been specially prepared for the rapid disembarkation of her complement, and large openings for the exit of the troops had been cut in her sides, giving on to a wide gang plank by which the men could pass rapidly into lighters which she had in tow. As soon as the first tows had reached land the *River Clyde* was to be run straight ashore. Her lighters were to be placed in position to form a gangway between the ship and the beach, and by this means it was hoped that 2000 men could be thrown ashore with the utmost rapidity. Further, to assist in covering the landing, a battery of machine guns, protected by sandbags, had been mounted in her bows.

The remainder of the covering force detailed for this beach was then to follow in tows from the attendant battleships.

V beach is situated immediately to the west of Sedd-el-Bahr. Between the bluff on which stands Sedd-el-Bahr village, and that which is crowned by No. 1 Fort, the ground forms a very regular amphitheater of three or four hundred yards radius. The slopes down to the beach are slightly concave, so that the whole area contained within the limits of this natural amphitheater, whose grassy terraces rise gently to a height of 100 feet above the shore, can be swept by the fire of a defender. The beach itself is a sandy strip some 10 yards wide and 350 yards long, backed along almost the whole of its extent by a low sandy escarpment about 4 feet high, where the ground falls nearly sheer down to the beach. The slight shelter afforded by this escarpment played no small part in the operations of the succeeding thirty-two hours.

At the southeastern extremity of the beach, between the shore and the village, stands the old fort of Sedd-el-Bahr, a battered ruin with wide breaches in its walls and mounds of fallen masonry within and around it. On the ridge to the north, overlooking the amphitheater, stands a ruined barrack. Both of these buildings, as well as No. 1 Fort has been long bombarded by the fleet, and the guns of the forts had been put out of action; but their crumbled walls and the ruined outskirts of the village afforded cover for riflemen, while from the terraced slopes already described the defenders were able to command the open beach, as a stage is overlooked from the balconies of a theater. On the very margin of the beach a strong barbed-wire entanglement, made of heavier metal and longer barbs than

I have ever seen elsewhere, ran right across from the old fort of Sedd-el-Bahr to the foot of the northwestern headland. Two-thirds of the way up the ridge a second and even stronger entanglement crossed the amphitheater, passing in front of the old barrack and ending in the outskirts of the village. A third transverse entanglement, joining these two, ran up the hill near the eastern end of the beach, and almost at right angles to it. Above the upper entanglement the ground was scored with the enemy's trenches, in one of which four pom-poms were emplaced; in others were dummy pom-poms to draw fire, while the débris of the shattered buildings on either flank afforded cover and concealment for a number of machine guns, which brought a cross-fire to bear on the ground already swept by rifle fire from the ridge.

Needless to say, the difficulties in the way of previous reconnaissance had rendered it impossible to obtain detailed information with regard either to the locality or to the enemy's preparations.

As often happens in war, the actual course of events did not quite correspond with the intentions of the commander. The *River Clyde* came into position off Sedd-el-Bahr in advance of the tows, and just as the latter reached the shore, Commander Unwin beached his ship also. Whilst the boats and the collier were approaching the landing place the Turks made no sign. Up to the very last moment it appeared as if the landing were to be unopposed. But the moment the first boat touched bottom the storm broke. A tornado of fire swept over the beach, the incoming boats, and the collier. The Dublin Fusiliers and the naval boats' crews suffered exceedingly heavy losses while still in the boats. Those who succeeded in landing and in crossing the strip of sand managed to gain some cover when they reached the low escarpment on the further side. None of the boats, however, were able to get off again, and they and their crews were destroyed upon the beach.

Now came the moment for the *River Clyde* to pour forth her living freight; but grievous delay was caused here by the difficulty of placing the lighters in position between the ship and the shore. A strong current hindered the work, and the enemy's fire was so intense that almost every man engaged upon it was immediately shot. Owing, however, to the splendid gallantry of the naval working party, the lighters were eventually placed in position, and then the disembarkation began.

A company of the Munster Fusiliers led the way; but, short as was the distance, few of the men ever reached the farther side of the beach through the hail of bullets which poured down upon them from both flanks and the front. As the second company followed, the extemporized pier of lighters gave way in the current. The end nearest to the shore drifted into deep water, and many men who had escaped being shot were drowned by the weight of their equipment in trying to swim from the lighter to the beach. Undaunted workers were still forthcoming, the lighters were again brought into position, and the third company of the Munster Fusiliers rushed ashore, suffering heaviest loss this time from shrapnel as well as from rifle, pom-pom, and machine-gun fire.

For a space the attempt to land was discontinued. When it was resumed the lighters again drifted into deep water, with Brigadier General Napier, Captain Costeker, his brigade major, and a number of men of the Hampshire Regiment on board. There was nothing for them all but to lie down on the lighters, and it was here that General Napier and Captain Costeker were killed. At this time, between 10 and 11 a. m., about 1000 men had left the collier, and of these nearly half had been killed or wounded before they could reach the little cover afforded by the steep, sandy bank at the top of the beach. Further attempts to disembark were now given up. Had the troops all been in open boats but few of them would have lived to tell the tale. But, most fortunately, the collier was so constructed as to afford fairly efficient protection to the men who were still on board, and, so long as they made no attempt to land, they suffered comparatively little loss.

Throughout the remainder of the day there was practically no change in the position of affairs. The situation was probably saved by the machine guns on the *River Clyde*, which did valuable service in keeping down the enemy's fire and in preventing any attempts on their part to launch a counter-attack. One half-company of the Dublin Fusiliers, which had been landed at a camber just east of Sedd-el-Bahr village, was unable to work its way across to V beach, and by mid-day had only twenty-five men left. It was proposed to divert to Y beach that part of the main body which had been intended to land on V beach; but this would have involved considerable delay owing to the distance, and the main body was diverted to W beach, where the Lancashire Fusiliers had already effected a landing.

Late in the afternoon part of the Worcestershire Regiment and the Lancashire Fusiliers worked across the high ground from W beach, and seemed likely to relieve the situation by taking the defenders of V beach in flank. The pressure on their own front, however, and the numerous barbed-wire entanglements which intervened, checked this advance, and at nightfall the Turkish garrison still held their ground. Just before dark some small parties of our men made their way along the shore to the outer walls of the old fort, and when night had fallen the remainder of the infantry from the collier were landed. A good force was now available for attack, but our troops were at such a cruel disadvantage as to position, and the fire of the enemy was still so accurate in the bright moonlight, that all attempts to clear the fort and the outskirts of the village during the night failed one after the other. The wounded who were able to do so without support returned to the collier under cover of darkness; but otherwise the situation at daybreak on the 26th was the same as it had been on the previous day, except that the troops first landed were becoming very exhausted.—*Army and Navy Gazette*, 7/10.

GERMAN SUBMARINES AT DARDANELLES.—Some further particulars are now available of the voyage of Lieutenant Commander Otto Hersing's boat to the Dardanelles. He left Wilhelmshaven on April 25 and reached the Straits on May 25, when he torpedoed the *Triumph*. Life conditions in the submarine were not bad, he asserts in an interview, and as she mostly traveled on the surface the officers and crew, except the engineers, had frequent chances of obtaining fresh air. Those who have kept in touch with the progress of submarine construction will not be surprised at the length of this run, for it has been known for some time that the newer boats can go anywhere provided they have the means of renewing their supplies. There does not seem to be any great difficulty in arranging for this, although we are not told, of course, at what places or in what way Hersing's vessel, which is now described as *U 51*, obtained her stores of oil and other commodities. The *Neueste Nachrichten*, we notice, has suggested to the United States people that as the distance from Wilhelmshaven to the Dardanelles is about 5000 miles, while that between Bremen and New York is only 3600 miles, German submarines, in the event of America making war on Germany, could cross the Atlantic and torpedo American men-of-war. There is nothing impossible in this threat, though whether it is probable, supposing war came about, is another matter, dependent, as we have said, on the matter of supplies. In going to the Dardanelles, Hersing's boat may have put in at various lonely places on the coasts of Spain or Morocco, for instance, and received there by arrangement a sufficient quantity of oil to carry her to an Austrian port. In crossing the Atlantic, however, she would have to rely mainly on her captures, a more risky matter unless a project was completed with a neutral vessel or two to carry supplies to certain rendezvous.—*Army and Navy Gazette*, 7/3.

"U 51" REPORTED SUNK.

LONDON, Saturday July 17.

The German submarine *U 51* has been sunk in the Black Sea by Russian warships, according to information received from Varna, a Bulgarian port on the Black Sea, by the Athens correspondent of the Exchange Telegraph Company.

The *U 51* was the submarine which made the voyage from Germany to the Dardanelles. She was commanded by Captain Otto Hersing.—*N. Y. Times*, 7/17.

An English naval officer who arrived in New York on June 29 is quoted by the *New York Times* as saying that no German submarine reached the Dardanelles by steaming through the Straits of Gibraltar. He pointed out that so dangerous a trip would have been decidedly unmilitary, since the Germans have established a submarine base and factory on the Bosporus near Constantinople and are turning out under-water craft there as in their own home factories. The parts for the submarines are manufactured in Germany and sent by rail to Constantinople via Austria, Rumania and Bulgaria, despite the surface neutrality of the two latter countries. Naturally, he says, the battleships of the Allies withdrew from the Dardanelles when the submarines were put into operation. Regarding the shipping of submarine parts, Simon Lake, the submarine inventor, said in the *Times* a few days ago that during the Russian-Japanese war ten years ago he made submarines here and shipped them to Russia for use in Asiatic waters.—*Army and Navy Journal*, 7/10.

SMYRNA BASE DESTROYED.—The risk of German submarines doing much damage in the Mediterranean and about the Suez Canal has been much lessened by the destruction of the oil-fuel base discovered near Smyrna, which has terminated their activity outside the Dardanelles, and so long as the Allies are able to prevent them from getting out of the Sea of Marmora they are not likely to do much further mischief.—*Shipping Illustrated*, 7/10.

PACIFIC AND ATLANTIC

GERMANY

American Waters

Karlsruhe, light cruiser (unofficially reported wrecked).

ENGLAND

East Indies.
1 battleship.
2 light cruisers.

Persian Gulf.
4 small craft.

Cape of Good Hope.
3 cruisers.
1 gunboat.

New Zealand.
3 cruisers.
1 sloop.

Royal Australian Navy.
1 battle cruiser.
3 light cruisers.
3 destroyers.
2 submarines.

West coast Canada.
2 submarines.

West coast of America.
2 gunboats.

FAR EAST

Naval powers in the Far East are represented as follows:

FRANCE

2 armored cruisers.
1 destroyer.
1 gunboat.
4 river gunboats.

GREAT BRITAIN

1 battleship.	10 river craft.
2 light cruisers.	6 sloops.
2 cruisers.	Some other small craft.
8 destroyers.	(The armored cruisers have a
4 torpedo-boats.	speed of from 20 to 25 knots, and
3 submarines.	the destroyers, 26 knots.)

JAPAN

2 dreadnoughts.	13 light cruisers.
13 pre-dreadnoughts.	52 destroyers.
2 battle cruisers.	27 torpedo-boats.
13 armored cruisers.	15 submarines.

The disposition of these ships is problematical. The more powerful ships of France and Great Britain are probably operating in other areas.

FALKLAND FIGHT.—The following was written by Vice Admiral Sturdee's flag lieutenant on board the British *Invincible* to a friend in England:

"We arrived at Port Stanley, in the Falkland Islands at 11 o'clock, the day before yesterday, and we all started to coal, getting in stores, etc., and of course there was lots of signaling to be done, and lots to arrange, and I was busy all day till very late. About 7.30 a. m. yesterday, I was sitting in my dressing gown and feeling very sleepy, drinking a cup of tea, when a signalman came in and reported, 'Sapper Hill reports two men-of-war approaching.' So I tore into the admiral's cabin and told him, then flew to my cabin, and got into some clothes. We had colliers alongside and steam was not up, at least it was at two hours' notice; so there was a proper bustle and scurry, and we told the colliers to shove off at once.

"Meanwhile, on came these two, the *Gneisenau* and the *Leipzig*. Then came the *Scharnhorst*, the *Dresden*, and the *Nürnberg* over the horizon. They never knew the *Invincible* and *Inflexible* were anywhere but in the North Sea, and as soon as they saw us they turned and ran. Well, we got out of the harbor in an hour and a quarter, and off we went after them. We got within ten miles of them at noon, so we slowed down to let the men have some food before the fight. At a quarter to one we went on at full speed, the *Glasgow* and ourselves, followed about three miles, astern by the *Carnavon*, *Cornwall*, and *Kent*. The last three couldn't keep up.

"At one o'clock we opened fire slowly, just trying the range, and we hit the *Nürnberg* or the *Leipzig*, I don't know which it was. Anyhow, she steered away, and I signaled to the *Kent* to chase her. The *Glasgow* turned around, too, without signal, and went after her.

"We were going about 26 knots and closing the enemy fast. The *Dresden* and *Leipzig* turned away, so it left the *Scharnhorst* and the *Gneisenau* to fight a duel with us. After the German small cruisers left, the *Scharnhorst* turned around and opened fire on us; so did the *Gneisenau*, and they shot fiendishly well.

"*Germans Score Hits.*—We went on hammering away for some time, getting closer and closer, and they were hitting us pretty badly. I thought one foremast had gone once. The admiral and I were half way up so as to get a good view. One of the legs of the mast was shot away. Shell fire is unpleasant, to put it mildly. Exploding shells, when they hit the ship, are worse, as one wonders how many she will stand. The admiral was wonderfully cool and collected, and I bobbed my head at every shell, and got a stiff neck from doing it. Well, we turned then, and they turned, too; but it threw their fire off, the shell hitting the ship and bursting, splinters flying, and the ship catching fire here and there, and the awful din, all rather upsetting to the nerves. They turned again, so off we had to go after them and at it again; then the *Scharnhorst* suddenly heeled over and went down bow first, her engines still going, colors flying, and guns firing.

"*Gneisenau's Hard Fight.*—The *Gneisenau* hesitated, or seemed to, as she passed her flagship. We were still shooting at them, and then she came on, hammer and tongs; still we went on till 6 p. m., when she turned right around and ceased firing. She still had her colors flying, so we went on till I reported to the admiral that all her men were assembling on the forecastle and she was turning over. Away she went, and some 300 were left swimming and hanging on to the wreckage in the water.

"It was the most awful sight I have ever seen. The water was just about freezing and they were all calling out; one could hear them three-quarters of a mile off. We steamed up and lowered what was left of our boats and we picked up seven officers and 98 men. The *Inflexible* picked up a lot more, but they were drowning right and left, too weak to hold on. Some were wounded, of course. One couldn't help being upset about it. I counted 24 men sinking in one small patch; the water was very clear.

"The *Glasgow* and the *Cornwall* sank the *Leipzig*, and the *Kent* sank the *Nürnberg*, so we had a great victory. We were pretty badly knocked about, and you never saw such a mess of twisted iron and huge holes, and the wonderful thing, it is really almost beyond belief, we hadn't got one casualty. Commander Townsend was knocked down and bruised his head, but that was all. It will take some repairing. We were hit 34 times by 8-inch shells, and they do make a mess of things, I can tell you."—*N. Y. Times*, 7/4.

"MACEDONIA" RECAUGHT.—The Admiralty on April 30 made the following announcement: "The German steamship *Macedonia*, which escaped from Las Palmas, Canary Islands, a few weeks ago, has now been captured by one of our cruisers." The *Macedonia*, which acted as collier and supply ship to the German commerce destroyers in the Atlantic, was brought to Las Palmas in October last by the Spanish warship *Cataluna*. On March 16 she mysteriously disappeared, taking advantage of the absence of her guardship, and getting away before dawn. The *Macedonia* is a vessel of 4347 tons, owned by the Hamburg-American Line.—*Army and Navy Gazette*, 5/8.

"KENT" IN PORT

VICTORIA, B. C., July 5.

"Sink 'er Allen" is the expressive term by which Captain J. D. Allen, of H. M. S. *Kent*, is popularly known to the crew of his warship. After a cruise of about nine months, during which period she sunk the German cruiser *Nürnberg* in the battle of the Falkland Islands and assisted in the destruction of the *Dresden* off the Juan Fernandez Islands, the *Kent* has steamed into Esquimalt, B. C., for repairs.

It was learned that when the *Kent's* captain received orders to chase the *Nürnberg*, off the Falkland Islands, he spoke to his men, telling them in the blunt words of a sailor and a fighter that not only must the fleeing German vessel be caught, but that she must be sunk.

"We must sink 'er," he exclaimed, and the sailors echoed, "You're jolly well right! We will sink 'er!"

"Tear up anything that will burn and throw it in the fires," was the captain's command. Companionways, boats, chicken coops, furniture, everything combustible on board the ship, with the sole exception of the best furniture in the officers' quarters was sacrificed. The only reason it did not go was because it was not necessary.

The *Kent* did better than on her trial trip twelve years before and came within range. The rest was "up to" Captain Allen's maneuvering and the marksmanship of the gunners. Both proved equal to the occasion. The British ship was struck thirty-six times, but while this was happening the German had been incapacitated and slowly was sinking.

From the captain to the humblest able seaman full credit is given for the bravery of the German crew. They stood to their guns to the last.

Taking the circumstances into account, however, the *Kent's* losses were insignificant. Only seven or eight casualties was the total, but the ship's armor was penetrated several times above the water-line and her decks were pitted.—*N. Y. Herald*, 7/16.

An interesting and instructive letter from an officer concerning the doings of the cruiser *Kent*, and how she came to corner the *Dresden*, was published in the *Morning Post* on June 29. What this letter shows more than anything else is the very meager knowledge at present revealed to the country of the work of the navy. We knew that the *Kent* caught the *Dresden* and helped to sink her on a certain date. What we had not learnt but only suspected, was the amount of hard work and toil put in by the cruisers in chase of her, from the time she escaped from the Falklands on December 8 to the time when she was destroyed three months later. On March 4, for instance, the *Kent* received orders to make for a certain spot. She steamed 17 knots day and night for 36 hours, but not a sign of a ship was there. "However," says the officer in his letter, "we were not downhearted, and we steamed about in the vicinity looking out in every direction until about 3 p. m. on the afternoon of the next day, we were rewarded by seeing the *Dresden* about eight miles away." Then everyone's whole energy was directed to catching her, but she escaped in the darkness. Tired out but dauntless, the officers and men of the *Kent* made for the nearest place to coal, and worked all day and night getting it on board in order to leave at the earliest possible moment. On March 14 they had their reward in the enemy's destruction. At least it may be said that the *Dresden* was sunk as much by the engineers and stokers in the British vessels as by the gunners whose shells actually struck her.—*Army and Navy Gazette*, 7/10.

IN THE VALLEY OF THE TIGRIS.—Excellent work continues to be done by the British forces in the valley of the Tigris. General Townshend has occupied the important town of Amarah on that river, 64 miles north of Kurnah, and received the surrender of the Governor of Amarah and his force of 700 soldiers. The captures to date include 80 officers and 2000 men, a large quantity of war material, 12 large steel barges, and one large and three small river steamers.—*Army and Navy Gazette*, 6/12.

CONQUER GERMANS IN SOUTH AFRICA

PRETORIA, July 9 (via LONDON).

General Botha, commander of the forces of the Union of South Africa, has accepted the surrender of all the German military forces in German Southwest Africa.

The Germans surrendered unconditionally, following the issuance of General Botha's ultimatum, which expired at 5 o'clock yesterday (Thursday) evening.

With the exception of the necessary army of occupation, the citizen army will be brought home as quickly as possible.

LONDON, July 9.

The surrender of the entire German force in German Southwest Africa closes one of the most important campaigns of the great war and releases for service elsewhere the South African contingent.

The campaign against the most important German African colony was considered so vital that all the resources of the South African Union were used in it, but its successful conclusion probably means that, despite the fact that German East Africa remains unconquered, a contingent will be dispatched to France, while additional forces will continue the campaign in East Africa.

The final disposition of German Southwest Africa has not been officially announced, but it is generally believed here that it will become a part of the South African Union.—*N. Y. Times*, 7/10.

"KÖNIGSBERG" DESTROYED

LONDON, July 12.

The Admiralty announces that the German cruiser *Königsberg*, which in the fall of last year took refuge from the British fleet in the Rufiji River in German East Africa, has been totally wrecked by British river monitors. The *Königsberg* was a vessel of 3348 tons and had a speed of about 23 knots. She was a protected cruiser.

The announcement of the Admiralty follows:

"Since the end of last October the *Königsberg* had been sheltering some distance up the Rufiji River in a position which rendered attack against her most difficult, only shallow-draft ships being able to get sufficiently close to engage the cruiser effectively.

"Two months ago the Admiralty decided to send two river monitors, namely, the *Severn*, Captain Eric Fullerton, and the *Mersey*, Commander Robert A. Wilson, to assist the commander-in-chief of the Cape station, Vice Admiral H. King Hall, in these operations.

"The position of the *Königsberg* was accurately located by air craft, and as soon as the monitors were ready the operations were begun. On the morning of July 4 the monitors entered the river and opened a fire, to which the *Königsberg* replied immediately, firing salvos with five guns with accuracy and rapidity. The *Mersey* was hit twice, and four men were killed and four wounded by one shell.

"As the *Königsberg* was surrounded by a jungle the aeroplanes experienced great difficulty in locating the fall of our shot. She was hit five times early in action, but after the monitors had fired for six hours the aeroplanes reported that the *Königsberg's* masts were still standing.

"A salvo then burst on her and she caught fire heavily between her masts. She continued to fire with one gun intermittently for a while, but for the last part of the engagement she did not fire at all, either on account of lack of ammunition or the disablement of her guns. Although not totally destroyed as a result of this engagement she probably was incapacitated.

"The commander-in-chief reports that the task of the monitors was an extremely difficult one on account of the jungle and the trouble of accurately spotted shots, but that they were assisted by H. M. S. *Weymouth*, Captain Donis Crampton, on which ship the commander-in-chief flew his flag and which followed them across the bar of the river and engaged the small guns on the banks, while H. M. S. *Pioneer*, Acting Commander T. W. Biddlecombe, Royal Australian Navy, engaged the guns at the mouth of the river.

"To complete the destruction of the *Königsberg* the commander-in-chief ordered a further attack on July 11, and a telegram now has been received stating that the ship is a total wreck. In this last engagement our casualties were only two men wounded on the *Mersey*."—*N. Y. Times*, 7/13.

MISCELLANEOUS NOTES

50-MILE MOTOR BOATS TO ROUT SUBMARINES.—The C. C. Smith Boat and Engine Company, of 1205 Lexington Avenue, announced July 6 that it had been asked by the British, French, and Russian governments to submit estimates for the construction of powerful motor speed boats, of sufficient strength to permit the mounting of two or more light guns, the boats to be used, it is understood, in running down German submarines in the waters around England and France and in the Baltic. The British Goverment, it is understood, wants a fleet of at least 100 of these craft, while the Russians, it is said, want 30 or 40.

The boat proposed is to be 30 feet long and seven feet beam, guaranteed to make 50 miles an hour. It will be easy to navigate and even when traveling at great speed will be able to turn sharply. The Smith factory is in Canada, near Detroit, on the St. Clair River, and so no possible violation of American neutrality is involved.

The motive power of the boats will be furnished by twin engines, each of 250 horse-power, and the guns will be mounted one on each side just forward of the driving gear. Each boat can carry, if necessary, fuel and supplies sufficient to last several days, although it is contemplated that this will not be needed as, owing to the speed of the boats, they can make port whenever necessary. Furthermore, they can be equipped with light wireless sets. Each boat will displace about four tons.

"Such boats as those contemplated." said a representative of the manufacturers yesterday, "would be able to dart about in the submarine infested waters, and owing to their great speed would be practically immune from submarine danger. They would be difficult to locate through a periscope owing to the smallness of the target offered. They could operate between France and England and could patrol back and forth across the Channel at the rate of a trip an hour."

In *The New York Times,* July 6, an article was printed saying that it was rumored on Wednesday that the British Government was about to place orders here for a large number of motor boats for scouting against submarines. It was said that the number desired was about 1000. The boats, it was said, would be equipped with long steel shod beaks for ramming submarines, and were to be armed with quick-firing guns. The estimate asked of the Smith Company undoubtedly had to do with the big orders Great Britain is understood to be ready to place in this country and Canada.—*N. Y. Times,* 7/7.

SUNKEN NET OF STEEL GUARDS TRANSPORTS.—Ever since the German submarine activity began in the war zone around the British Isles wonder has been expressed that the great stream of transports carrying British troops and supplies to France, has apparently flowed on, unchecked by the undersea craft of the Kaiser.

The German failure to interfere with this vital traffic of the foe was explained yesterday by travelers reaching here from London and Berlin, who had opportunity in both capitals to speak with men in high official circles.

Contrary to the general notion that a protective lane of torpedo-boat destroyers and other warships is maintained by the Allies across the English Channel, it is learned that there has been stretched from Folkestone to Cape Gris-Nez a wire cable netting, with meshes 18 inches square. The cables, woven by the firm of Capham & Morris, wire drawers, in the north of England, is clamped togethed in sections. It is submerged to a depth of about 150 feet, and kept in place by anchor buoys. This submarine "deadline" the German U-boats cannot pass.

A narrow passage left open, according to the British Admiralty announcment, for merchant shipping by way of the Downs and Deal, is carefully guarded by torpedo-boats and torpedo-boat destroyers.

That the German submarines have been unable to get at the Allies' troopships and supply ships beyond the submerged netting, is explained by the fact that their 3000 miles cruising radius, while permitting them to pass through the North Sea and around the British Isles and return to their bases, falls short just before the protected area is reached.

The German Government has never stated how many submarines it has lost. The English Admiralty, also, has maintained silence on the subject, mentioning only such cases as resulted in the capture of officers or crews of the German U-boats, whose presence in England would need explanation.

Travelers from Berlin, however, who had access to officials in authority there, said yesterday that it was admitted by competent authorities in the German capital that 14 German submarines had been lost up to three weeks ago. The conjecture is that many of these may have come to grief in the meshes of the British cable netting. Traveling at a speed of six to eight knots under water these ships would thrust their way inextricably into the tangle of steel before they could be brought to a stop and freed.—*N. Y. Times*, 6/19.

UNITED STATES TAKES SAYVILLE WIRELESS

WASHINGTON, July 8.

The government to-day took over the Sayville, L. I., wireless station, the only privately operated, direct means of communication between the United States and Germany. Secretary Daniels announced that Captain Bullard, in charge of the naval radio, had this afternoon taken over the station and would continue its operation with naval forces.

Secretary Redfield in a letter to Secretary Lansing recommending that the United States take over the Sayville station, said investigation had shown that the new sending station, for which license was asked, had all been erected since the beginning of the war, with apparatus made in Germany; that the company was entirely German owned, working with stations in Germany under government control and that Professor J. Zenneck, a captain of marines of the German Navy, and wireless expert, had been assigned by the German Government to conduct experiments there. To grant a license to such a station, Secretary Redfield said, the department had concluded would be an unneutral act.—*Boston Transcript*, 7/8.

MR. HURD'S SUMMARY OF WHAT GREAT BRITAIN HAS ACHIEVED.—(1) Our supreme fleet, assisted by the French fleet (much weaker than that of Germany alone, and hopelessly inferior to the navies of Germany and Austria-Hungary combined), has won command of the sea and given our Allies freedom of maritime communication, enabling them to replenish their stores of war munitions. If we had not rendered this service, could our Allies have maintained the struggle?

(2) We have placed our unsurpassed financial resources at the disposal of our Allies; without our aid Belgium could not have continued to fight; Serbia would have been bankrupt; France and Russia would have been embarrassed. If we had not rendered this service, could our Allies have maintained the struggle?

(3) The United Kingdom has been the only country in Europe from which our Allies could draw munitions of war. Belgium, occupied by the enemy, has had an army in the air since August last; France has had some of her most flourishing industrial departments overrun by the enemy; Russia, which is not a great manufacturing country, has required every description of munitions of war. We have directly or indirectly supplied all these needs. If we had not rendered these services, could our Allies have continued the struggle?

(4) Within nine months of the opening of hostilities British military forces were actively engaged against the enemy in eight theaters of war: (*a*) France; (*b*) the Dardanelles; (*c*) Egypt; (*d*) the Persian Gulf; (*e*) German Southwest Africa; (*f*) German East Africa; (*g*) the Cameroons; and (*h*) Kiao-chau, where we co-operated with Japan, not to mention the action taken against German islands in the Pacific.

(5) In the opening months of the war we not only poured an increasing number of well-equipped troops into France, and then into the Gallipoli Peninsula, but we raised the new armies.

If we had not landed a single soldier in France or in the Gallipoli Peninsula, and had recruited no new armies, we should have the satisfaction of knowing that we had taken no mean part in bringing Germany nearer to defeat.

One valid criticism which can be directed against the government is that its military effort was pursued without proper regard to the more essential and valuable services which this country could render as the source of supplies for our Allies. The case has been well put—with an element of exaggeration—by the *Statist:*

". . . . Russia, France, and Belgium all need immense supplies of munitions . . . .

"Instead of recognizing all this and preparing to fulfill the expectations entertained respecting us, we, under military initiative, decided to call out great armies almost as large as those of France. It will be recollected how the Prime Minister stated at Newcastle the other day that 217,000 coal-miners had been enlisted, while only 70,000 had been brought in from other occupations to take their place. Thus, when the speech was made, we had working in our mines 147,000 coal-miners less than before the war broke out. Yet coal is essential for the navy, for the mercantile marine, for every factory in the country, leaving out of account domestic uses altogether. And with all that in view, and the demand for unheard-of amounts of war munitions, we deliberately reduced our mining staffs by 147,000 men, and those men, remember, the very cream of the coal-mining population . . . .

"If we had maintained civilian control of the government we might have been compelled to increase the army. We might have found it necessary to put a million or so men in the field in France. But it is very improbable that we should have found ourselves without men enough to supply ourselves and our Allies with munitions of war."—ARCHIBALD HURD, *Fortnightly Review,* June.

SUBMARINE BLOCKADE LEGITIMATE. *Rules Suggested by Italian Writer.*—According to an article in the March *Rivista Marittima* (La Leggi della Guerra Marittima nel Conflitto *Anglo-Germanico*), submarine blockade must be recognized and legalized as a necessary form of naval warfare. To safeguard the rights of life and property, rights which the writer considers "not comprised in the limited rights of nations, but in the larger rights of humanity," the following rules are suggested for the control of such blockade:

Article I. Blockade of enemy territory by means of mines and submarines is allowed.

Art. II. Belligerents are required to give proper notification of the zones covered by such blockade, and to use mines constructed in accordance with international conventions.

Art. III. A vessel that violates said blockade, having received due notification, as shown by the date of its clearance papers, shall be confiscated and may be destroyed.

Art. IV. A vessel that is unaware of the existence of the blockade, shall be warned and permitted to return to waters outside the blockaded zone.

Art. V. The destruction of a merchant vessel, either neutral or enemy, shall take place only after a reasonable time has been granted for securing the safety of passengers and crew. The captain shall take care to save his ship's papers.

Art. VI. A merchant vessel, stopped by a submarine, shall at once comply with the order and send its papers in its own boat for inspection.

Art. VII. National prize courts, and international tribunals, in case of appeal, shall be competent to pass on the legality of operations carried on by submarines.

NAVAL PUBLICATIONS

BOOK REVIEWS

"Fleets of the World, 1915." Compiled from official sources and classified according to types. 198 pages. Oblong 8vo. Cloth $2.50. J. B. Lippincott Company; Philadelphia. (London, Eveleigh Nash.)

This book gives in a handy way the date of completion, displacement, speed, armament, and complement of all the ships in all the navies of the world. There are also 103 full page photographic illustrations and the contents include a short glossary of naval terms, comparative tables of the large caliber guns and projectiles of the great fleets of the world, and a list of ships lost in the war from August 5, 1914, to April 15, 1915.

C. C. G.

"Les Flottes de Combat en 1915." By Commandant de Ballincourt. (Augustin Challamel, Editeur, Paris, 17 Rue Jacob.)

This book comprises 828 pages rich in warship data. The navies of the world are taken up in alphabetical order and two pages devoted to each class of ships. On one page are line sketches in plan and elevation indicating prominent features and the general arrangement of armor and armament. On the opposite page facing the sketches are the names of the ships of that particular class, their principal dimensions, draft, displacement, number of engines, horse-power, speed, number and kind of boilers, coal capacity, steaming radius, and details of armor and armament. The treatment of each class is concluded with brief "Observations" which are interesting and informing in both a technical and an historical way. The usefulness of this book is further increased by a complete alphabetical index and a list of ships lost by each power in the present war correct up to about March 4, 1915, with space provided for entering subsequent losses.

C. C. G.

NAVAL ACADEMY GRADUATES ASSOCIATION

The thirtieth annual reunion of the graduates of the Naval Academy was held on June 3.

At the business meeting held in the afternoon, Comdr. C. E. McKay, U. S. N. (Ret.), Class '61 presided.

The membership of the Council for the ensuing year as elected, is as follows:

Hon. R. M. Thompson, '68.....Member
Rear Admiral W. F. Fullam, U. S. N., '77..... "
Chief Const. D. W. Taylor, U. S. N., '85..... "
Capt. L. H. Chandler, U. S. N., '88..... "
Comdr. J. F. Hines, U. S. N., '92..... "
Prof. D. M. Garrison, U. S. N., '95..... "
Lt. Comdr. C. Shackford, U. S. N., '99..... "
Prof. D. M. Garrison, U. S. N., '95.....Sec. Treas.

The change in Art. 3, Sec. 1, of the constitution was adopted, and having been voted on affirmatively at two annual meetings, becomes effective. The new section may be found in the last number of the PROCEEDINGS.

The Farragut Memorial Window Committee made a report through its Secretary Treasurer, which report will be found appended. It is desired that every graduate should read it over carefully, as it very well sets forth the adverse conditions under which the committee are working.

The cases of two members of the Association who have been dismissed from the service during the last year were taken up, and expulsion from the Association voted in each case.

3595 Robinson, Earl Wayne, Class '10, Ass'n No. 1941.
Dismissed, Dec. 3, '14, Ens.

3665 Hawley, Darrell Bertrand, Class '11, Ass'n No. 2018.
Dismissed, June 10, '14, Ens.

The subject of a proposed memorial to the late Lieutenant A. Corbesier, U. S. M. C. was taken up, and the chair appointed the following committee, with power to take all necessary steps:

Rear Admiral Asa Walker, U. S. N., '65
Hon. R. M. Thompson, '68.
Adj. General C. F. Macklin, '92.

It was moved and carried that Art. 5 of the constitution of the Association be changed to read as follows:

There shall be an annual meeting and dinner at such time and place as may be determined by the Council, ...

The wording of the present article is:

There shall be an annual meeting and dinner at the Naval Academy at such time and place as may be determined by the Council, ...

The purpose of the change is to place within the discretion of the Council the designation of the place of holding the annual dinner. As Art. 5 now stands, the dinner must be held at the Naval Academy. This proposed change will come up again next year and all graduates will be given an opportunity, by means of the postals enclosed in the dinner circulars, to vote for or against its final adoption.

In this connection I would like to make the following extract from the last number of "The Bulletin Board," '92's class publication:

The meeting (business meeting) ended with an animated discussion as to ways and means of stimulating interest in the Graduates' Association and particularly of increasing the attendance at the dinners. Next spring you will be called upon to express an opinion as to whether it would be a better plan to give the Council power to decide each year where the dinner was to be held; so that the place might be made to suit a larger number of graduates. When the time comes I will argue against the proposed change. In the meanwhile, think it over and have ready an answer worked out for yourself; don't follow blindly the opinion of the loudest talker in your neighborhood.

My own opinion of the way to increase interest in the Association is by giving the graduates work to do. The more constructive work the Association does, the more will its membership be interested. In my opinion, it is to the Graduates' Association that the big questions of policy at the Academy should be referred.

The annual dinner was held in Mahan Hall at 7.30 p. m., 103 graduates being present. Commander. McKay, Class '61 presided, and Captain G. R. Clark, U. S. N., Class '78 acted as toastmaster. The toasts with their responders were:

"The President"—Secretary of the Navy.
"The Navy"—R. Admiral B. A. Fiske, U. S. N., '74.
"The Naval Academy"—R. Admiral W. F. Fullam, U. S. N., '77.
"Graduates in Civil Life"—Mr. William McKay, '85.
"Class '85"—Nav. Const. J. G. Tawresey, U. S. N., '85.

It is no exaggeration to say that the speeches made the 1915 dinner the success it was. Admiral Fiske's speech has, no doubt, been read by every graduate. The Superintendent paid a tribute to the old attaches of the Academy, Jarvis, Dennis, Denver, names of those who for years were daily sights about the grounds of the old Academy. He closed with an appreciation of our old swordmaster, Corbesier; one who won his way to our hearts, through a medium of aching arms and limbs.

All the names of the roads and rows of the Academy have been returned, as near as may be, to their original locations, and those which had not been previously named have received appropriate designations. Furthermore, the positions of all the old buildings have been marked by means of stone tablets, placed as near as possible in the exact location of the front doors of the several buildings. These innovations have been very aptly termed by the Superintendent as "aids to navigation," and will undoubtably prove such to any old timer coming back to his Alma Mater.

Report of the Farragut Window Committee:

ANNUAL REPORT PRESENTED AT THE BUSINESS MEETING OF THE GRADUATES' ASSOCIATION

Admiral Watson asked me to say that he had considered seriously the question of coming to Annapolis to attend this meeting, as he knew it would be a pleasure besides feeling that it was his duty. But he was sure that on account of the precarious condition of his health, the fatigue and excitement of the trip would be bad for him; and so he was compelled to give it up. He has asked me to report progress for the committee. We have not had a meeting recently to draw up a report, so I can only tell you informally what has been done.

Artistically, progress has been slow. Full-sized drawings of the design which had been tentatively accepted by the committee were submitted in February. The committee directed that certain changes be made, and when these were completed, the whole was brought to Annapolis and submitted to the Board on Memorials of the Naval Academy. There considerable discussion arose over certain features of the design. When these were brought to the attention of the artists, it developed that they had always agreed with the new view, but had submitted the original in the belief that it was what we wanted. All are now agreed as to the wisdom of certain changes, and a whole new central panel is being made by the artist. As we cannot have a meeting before October next, the artist was told not to hurry; and I have not heard recently what progress he is making.

The inscription to be placed on the window has been the object of considerable thought on the part of the committee and of the Naval

Academy authorities. The committee will welcome suggestions on this subject. Does the Association prefer a simple inscription, such as "In memory of Admiral David Glasgow Farragut, U. S. Navy"; or a more voluminous inscription? Any suggestions sent to me will be welcomed and will be placed before the committee.

The District of Columbia Commandery of the Loyal Legion some time ago passed a resolution commending the project of the Farragut Memorial Window; as the secretary will refer to this in the order of business, I will say nothing more about it at this time.

The rest of the committee's work has been that of raising funds. A circular letter was sent out by the committee in October last to all graduates. Those graduates who are in the service and doing duty under a commanding officer, we sought to reach through their commanding officers. It is possible that some graduates were not reached, not a great many. A very large majority have been reached in this way. It has been a source of great surprise and distress to me to discover the apathy throughout the graduate body in this project. Personally I am optimistic, and I feel sure that we will get the required money in the course of time. But as it stands at present, the hearts of most of the graduates have not been touched. The first several hundred dollars came in rapidly and willingly, and there were many offers to pay more than the five dollars asked for. But after the first $3000 was raised, the rest has come in slowly, grudgingly, ungenerously; and lately there has been an entire stop to the receipt of subscriptions.

It does not appear that the desire to subscribe is confined to any class of graduates as regards date of graduation, nor to any class as regards status in life. Men in the service and out, active officers and retired, line officers, marines and staff, all seem to be giving in about the same proportion. There has certainly been no sectional feeling against the window. Men from all parts of the country, including some ex-Confederate officers, have subscribed generously.

It has been proposed by the Council of the Graduates' Association to send out a new circular to all who have not as yet subscribed their full quota of five dollars. I have asked them to postpone this until the fall, as during the summer it is impossible for me to care for a large correspondence or large receipts of money.

So far about 900 graduates have subscribed; I cannot give the exact number, for several ships have sent in lump sums without enumerating the subscribers. I have written to the captains of these ships, and will probably learn the names ultimately. The total amount subscribed to date is $3790, an average of $4.21 per subscriber. Since the beginning, the average has been maintained at only a little less than five dollars, in spite of the fact that the younger graduates afloat are giving rather less than their full quota of five dollars. I suppose that they have their own reasons, which probably are not financial. It looks generally as if the pace set by the older officers in each ship was what governed the subscriptions given by the younger officers.

The average is being maintained at more than four dollars; if every graduate gives that amount, it will aggregate enough to pay for the

window. But as every graduate cannot be counted on, we expect all who subscribe to give the full quota of five dollars. The estimated cost of erecting the window, including preliminary expenses, postage, etc., is $10,000. We now have $3800, and we have 900 subscribers out of 3000 living graduates.

At the first conception of the project, the Graduates' Association limited the subscription list to graduates of the Academy, and all other subscriptions have been refused. The committee has had no meeting to consider the question as to whether the graduates of this year's class should be allowed to subscribe. Unless I am otherwise instructed, I shall certainly accept their subscriptions if offered.

I feel sure that we are going to get the money in time, but if every graduate would take the matter to heart and talk about it and try to impress upon graduates the meaning of the whole project, the effect is bound to be good. It needs to be brought home to graduates what this window stands for. Among the younger officers there is not much feeling for Farragut; put before them the idea that they are doing something for their Alma Mater. Show them that this is an expression in concrete form of that thing that is known as the "Navy Spirit." Get them to see that it is a monument to the solidarity of the body of graduates. These, I think, are the things that should appeal to the younger men. The window is going to be a wonderful window. I feel that artistically, and in every other way, it is going to be an epoch-making window. Every subscriber will be proud of it when it is in place. Every one will want to feel, when he reads the inscription—"Presented by the Graduates of the Naval Academy"—that he had his share in making it a reality. All are not doing their share now; one lieutenant commander gave 50 cents—that was his idea of "Navy Spirit." Still I am optimistic.

CHANGES IN REGISTER

860 Class '68 Beehler, Wm. H.
Ret., June 30, '07, Commo.; died, June 23, '15, Annapolis, Md.

1015 " '70 Jacoby, Harry M.
Ret., Nov. 16, '83, Lt.; died May 18, '15, Philadelphia, Pa.

1139 " '73 Cowles, Walter C.
Ret., July 11, '15, R. Adml.

1205 " '74 Edwards, John R.
Ret., July 9, '15, R. Adml.

1481 " '80 Muir, William C. P.
Ret., June 30, '05, Comdr.; Died, June 20, '15, Shelbyville, Ky.

3335 " '08 Dolan, Carleton M.
Ret., May 11, '15, Lt. (J. G.).

3389 " '09 Ede, Alfred L.
Lost in U. S. S. *F-4*, off Honolulu, Hawaii, March —, '15. Exact date unknown.

3484 Class '09 Barney, Arthur.
Res., July 8, '15, Lt. (J. G.). Address: Kearney, Neb.

3510 " '09 Yates, Junius.
Dropped, May 25, '15, Ens.

3623 " '10 Parker, Timothy A.
Lost in U. S. S. *F-4* off Honolulu, Hawaii, March —, '15. Exact date unknown.

3731 " '11 Reynolds, Frank F.
Res., July 7, '15, Ens.

4046 " '13 Pearse, Clay L.
Died, June 19, '15, Ens. Key West, Fla.

(?) " '15 Manly, John McC.
Died, June 24, '15, Mid., Columbus, Ohio.

1161 " '73 Moore, Charles B. T.
Ret., July 29, '15, R. Adml.

3837 " '12 Saunders, Harold E.

3840 " '12 Zeigler, Samuel J., Jr.

3843 " '12 Pace, Ernest M., Jr.
Have been commissioned Assistant Naval Constructors.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It now enters upon its forty-second year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary, and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control, and a vote equal to one-half the number of regular and life members, given by proxy or presence, shall be cast, a majority electing.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control, and, if their report be favorable, the Secretary and Treasurer shall make known the result at the next meeting of the Institute, and a vote shall then be taken, a majority of votes cast by members present electing."

Sec. 8. The annual dues for regular and associate members shall be two dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be thirty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published every two months, and anyone may subscribe for them. The annual subscription is $3.00; single copies, 50 cents. Annual dues for members and associate members, $2.00. Fee for life membership, $30.00.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1916

A prize of two hundred dollars, with a gold medal, and a life-membership in the Institute, is offered by the Naval Institute for the best essay presented on any subject pertaining to the naval profession.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award for the prize will be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay in a sealed envelope to the Secretary and Treasurer on or before January 1, 1916. The name of the writer shall not be given in this envelope, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary and Treasurer, with the motto on the outside and writer's name and motto inside. This envelope is not to be opened until after the decision of the Board.

3. The successful essay to be published in the PROCEEDINGS of the Institute; and the essays of other competitors, receiving honorable mention, to be published also, at the discretion of the Board of Control; and no change shall be made in the text of any competitive essay, published in the PROCEEDINGS of the Institute, after it leaves the hands of the Board.

4. If, in the opinion of the Board of Control, the best essay presented is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention" or such other distinction as the Board may decide.

5. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

6. Any essay not having received honorable mention may be published also, at the discretion of the Board of Control, but only with the consent of the author.

7. The essay is limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

8. It is requested that all essays be submitted typewritten and in duplicate, if practicable; essays submitted written in longhand and in single copy will, however, receive equal consideration.

9. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

B. C. ALLEN,
Lieut. Commander, U. S. N., Secretary and Treasurer.

PRIZE ESSAY TOPICS

Suggested at the Invitation of the Board of Control

BY

THE PRESIDENT OF THE NAVAL INSTITUTE, THE SUPERINTENDENT OF THE NAVAL ACADEMY, THE PRESIDENT OF THE NAVAL WAR COLLEGE, AND THE COMMANDERS-IN-CHIEF OF THE ATLANTIC, PACIFIC AND ASIATIC FLEETS.

"The Mutual Relations of Gunnery and Tactics."

"The Place of the Naval Officer in International Affairs."

"The Evolution of Naval Doctrine from National Character."

"The Training of Enlisted Personnel to Produce Modern Man-o'-Warsmen: (a) Military Training; (b) Moral Training; (c) Education."

"The Organization, Employment and Training of Reserve Fleets and Flotillas."

"A Personnel Reserve for the Naval Service."

"Value of Speed as an Offensive Element in Battleship Strategy and Tactics, as Compared with Armor."

LIST OF PRIZE ESSAYS

1879

Naval Education. Prize Essay, 1879. By Lieut.-Com. A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut.-Com. C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser best suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of its Decline and the Means to be taken for its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. J. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut.-Com. F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How may the Sphere of Usefulness of Naval Officers be extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

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Torpedoes. Prize Essay, 1888. By Lieut.-Com. W. W. Reisinger, U. S. N.

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The Enlistment, Training and Organization of Crews for our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

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The U. S. S. Vesuvius, with Special Reference to her Pneumatic Battery. Prize Essay, 1894. By Lieut.-Com. Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

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Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut.-Com. Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

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THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

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The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

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Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

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1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut.-Com. Richard Wainwright, U. S. N.

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1900

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THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

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1903

Gunnery in Our Navy. The Causes of its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

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1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize Essay, 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear-Admiral Stephen B. Luce, U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut.-Com. A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906. By Pay Inspector J. A. Mudd, U. S. N.

1907

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A few thoughts on our next step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut.-Comdr. Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

1908

A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENCE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle? Second Honorable Mention, 1908. By Lieut.-Commander Yates Stirling, U. S. N.

1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotton, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

1912

Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut.-Commander T. D. Parker, U. S. N.

1913

The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut.-Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A Study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut.-Commander Dudley W. Knox, U. S. N.

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1914

The Great Lesson from Nelson for To-Day. Prize Essay, 1914. By Lieutenant Commander Dudley W. Knox, U. S. Navy.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. Navy.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieutenant Commander Dudley W. Knox, U. S. Navy.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. Navy.

1915

The Rôle of Doctrine in Naval Warfare. Prize Essay, 1915. By Lieutenant Commander Dudley W. Knox, U. S. Navy.

AN AIR FLEET: OUR PRESSING NAVAL WANT. First Honorable Mention, 1915. By Lieutenant Commander Thomas Drayton Parker, U. S. Navy.

TACTICS. Second Honorable Mention, 1915. By Ensign H. H. Frost, U. S. Navy.

DEFENSE AGAINST SURPRISE TORPEDO ATTACK. Third Honorable Mention, 1915. By Ensign R. T. Merrill, 2d, U. S. Navy.